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MOTHERS' INTERACTIONS WITH MENTALLY HANDICAPPED AND NONHANDICAPPED CHILDREN: FREQUENCY AND LAG-SEQUENTIAL ANALYSES

(C)

by

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled MOTHERS' INTERACTIONS WITH MENTALLY HANDICAPPED AND NONHANDICAPPED CHILDREN: FREQUENCY AND LAG-SEQUENTIAL ANALYSES submitted by KOFI MARFO in partial fulfilment of the requirements for the degree of DOCTOR OF PHILOSOPHY in SPECIAL EDUCATION.

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To My Mother

(In The Language We Both Understand)

Ampoma ba 'Beyaa,
Obaatan pa a
woate ohia mu 'hasuo'
de ahwe wo mma,
Mede wo din reto adwuma yi so
ahye wo animuonyam.

Eno Abenaa, mo ne yo;
Wo mmodenbo ne wo mpaebo
na ede me aduru ha.
Dee obaatan beye ara na woaye yi.
Odomankoma mma wo apomuden,
ahoto, ne onyinkye.

Abstract

Evidence from previous comparative studies suggests that interactions between mothers and their mentally handicapped infants/young children are different in various respects from the interactions of mothers with their nonhandicapped children. One of the central issues of concern in this area of research is the disturbing tendency on the part of researchers to imply from the results of CA-match studies that the high levels of activity and directiveness observed among mothers of mentally handicapped children represent *unique* interactive characteristics which differentiate them from mothers of nonhandicapped children.

The present study reflects the viewpoint that CA-match designs do not make it possible to separate patterns of interaction which may be unique to mothers of handicapped children from interation styles which may be shared by mothers of developmentally younger children in general. This distinction is necessary if meaningful implications for intervention are to be derived from the results of comparative studies. To address this problem, a short-term longitudinal design which uses both CA- and MA-match comparisons was adopted in the present study. Three groups of mentally handicapped child-mother dyads (nonintervention, short intervention, and long intervention groups) were compared with two groups of nonhandicapped children and their mothers (a CA-comparison group and a MA-comparison group). There were 45 mother-child dyads in the study, 9 dyads in each of the 5 groups. The mean CA and MA of the 27 mentally handicapped children were 15.9 and 10.5 months respectively. The nonhandicapped MA comparison group of children were on the average 11 months old and had a mean MA of 11.7 months while the CA-comparison group had a mean CA of 17.3 months.

There was one main assessment for all 5 groups during which each mother and her child were observed in their home over a 30-minute free play session. The 27 mentally handicapped children and their mothers received a follow-up assessment 6 to 7 months after the main visit. In addition to measures of dyadic interaction, the mentally handicapped children were assessed on the Bayley Scales of Infant Development and on the Reynell Language Scales.

The major dependent variables of interest were: (1) the quantity of interactions as measured by frequency counts of individual maternal and child behaviours and (2) the quality of dyadic interaction measured in terms of the extent to which mothers and their children were responsive to each other's behavioural intiations and/or responses (this aspect of interaction was examined through a sequential dependency analysis). The main data analysis involved a comparison of the mentally handicapped groups with the nonhandicapped groups on the assessment 1 data. In addition to the main analysis, however, a cross-time comparison involving assessment 2 data for the handicapped groups and assessment 1 data for the nonhandicapped groups offered an opportunity to confirm and/or replicate findings from the main analysis.

The results of the study showed that despite the absence of marked differences between the mentally handicapped and nonhandicapped children, mothers of the two categories of children differed in several interactive characteristics. In the frequency analyses, three categories of differences were identified. First, differences between mothers of handicapped and nonhandicapped children with regard to physical contact and positive expressive gestures were shown to be related to mental age differences between handicapped and nonhandicapped children and not to differences in diagnostic status necessarily. That is, mothers of developmentally younger children (and not just mothers of handicapped children) generally initiated more physical contacts and exhibited fewer positive expressive gestures than did mothers of developmentally older children. Second, with regard to maternal looking and instructional behaviour, the evidence suggested that differences between mothers of mentally handicapped and nonhandicapped children were independent of chronological and mental age characteristics of their children. That is, high levels of visual regard and instructional behaviour were unique to mothers of mentally handicapped children.

The sequential dependency analysis revealed that 10 characteristic sequential patterns were prominent in the interactions of mothers and their children. Only one of those patterns was unique to dyads with nonhandicapped children—only in the CA-comparison group did

children show a characteristic tendency to respond to their mothers' verbal stimulation with positive vocalization. Two qualitative patterns were unique to dyads with mentally handicapped children and both of them were affective in nature; mothers and their mentally handicapped children displayed a significant pattern of reciprocal visual regard while mothers responded significantly to their children's smiles by smiling back.

It is important to stress that as many as 5 of the 10 sequential patterns were observed in all groups of dyads: reciprocal positive expressive gestures; child compliance to maternal instruction; maternal reinforcement immediately following the child's compliance to verbal instruction; maternal imitation of children's positive vocalization; and maternal use of physical guidance immediately after instruction. These results showed that with the exception of affective responses mothers of mentally handicapped and nonhandicapped children were not very different in their responsiveness to certain key behaviours of their children.

The above results are discussed in relation to findings from previous comparative studies. Several suggestions for future research are made, the most important of which, perhaps, is the need to examine the implications of these findings for intervention with families of mentally handicapped children. This task, however, requires as a first step research to examine how much directiveness may be appropriate or inappropriate for the child's optimal development and learning.

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I. INTRODUCTION

A. Trends in the conceptualization of the mother-child interaction process

The study of parent-child interaction has a long history in the child development literature. However, much of that history is one of research involving parents and their nonhandicapped children. Interest in the day-to-day behavioural interactions between parents and their mentally handicapped or developmentally delayed children is fairly recent. Nevertheless, the past ten years have witnessed increased research activity in this area, as is evidenced by the research literature reviewed in the next chapter.

A gradual but nevertheless striking shift beginning in the early 60s has changed our conceptualization of the infant-environment relationship from a unidirectional environment control model to a bidirectional model of mutual effects of infant and environment on each other. This shift may have provided a theoretical-conceptual *zeitgeist* for the increased focus on mother-handicapped child interactions today. Although Bell's (1968) classic paper, *A reinterpretation of the direction of effects in studies of socialization*, is usually cited as setting the stage for this conceptual shift (Osofsky & Connors, 1979), several significant contributions predating Bell's paper are identifiable in the literature. In their research on parental behaviour, Sears, Maccoby, and Lewin (1957) alluded to possible constitutional differences among children which affected not only child but maternal behaviour. Consequently, Sears and his associates viewed the unidirectional parent-control model as only a convenient paradigm for the study of the parent-child relationship.

Wenar and Wenar (1963) not only criticized the parent-control model but emphasized the need to adopt methodologies which would enable the researcher to tease out the direction of influence. They discussed the theoretical implications of short-term prospective studies involving pre- and post-test measures, and used as an illustrative example the design of their own ongoing study of the relationship between maternal behaviour and infant executive competence (defined in terms of 'level, persistence, intensity, and independence of locomotor,

gross, and fine motor development'). It was clear from their design that they were interested not only in how maternal behaviour affected infant competence but also in how the latter impinged upon the former. Echoing the clinical work of Levy (1958), and lamenting the persistence of the unidirectional view of the parent-child relationship, Wenar and Wenar (1963) wrote:

> *... If the mother had had a different kind of child, she might well be a different kind of mother. This idea is by no means novel. Parents have known it all along, and it can be found in the observational and clinical literature. The notion of "mutual regulation between mother and infant, of certain infants being "good senders" of messages and "easy to read," of innately deviant infants who reduce their mothers to a state of agitation and despair are all relevant. Yet the matter of child-engendered adult behaviour only rarely receives serious attention.* (p. 704)

To some extent, the work of Wenar and Wenar (1963) can be said to have inspired or at least informed Bell's (1968) paper, for Wenar and Wenar had proposed:

> *To incorporate it [the notion of the infant's effect on its mother] into the mainstream of developmental research would almost require a new set of thinking habits, an alertness to the possibility of interpreting correlational data "the other way around." One would have to start entertaining the notion that unresponsive infants extinguish their mothers' loving behaviour or that temperamentally aggressive and willful children force their parents to become increasingly punitive in their socialization attempts.* (pp. 704-705)

In a paper originally presented at the Merrill-Palmer Institute in February 1962, Kessen (1963) reviewed several emerging findings on the characteristics of infants and proposed that "the infant is active, and the relation of infant and caretaker is reciprocal" (p. 91). Soon, Korner (1965) was to describe mother-child interaction as a "two-way street."

The paradigmatic change which the largely theoretical-conceptual work of Sears et al. (1957), Kessen (1963), Wenar and Wenar (1963), and Korner (1965) foreshadowed did not begin to manifest itself in empirical research until after Bell's (1968) paper in which he specifically re-examined existing parent-child interaction research at the time and suggested that most of the results presented in terms of parental effects on children could equally be interpreted the other way around. In fact, in the years immediately following Bell's work, a number of studies investigated the effects of several infant characteristics on the interaction patterns of mothers: sex (Moss, 1974), birth order (Thoman, Barnett, & Leiderman, 1971); temperament (Carey,1972); and the infant's responsiveness to tactile, visual, and auditory

stimulation (Brazelton, Koslowski, & Main, 1974). Most of these studies concluded that the infant characteristics isolated for study represented crucial variables which accounted for a wide range of defferences in the interaction patterns of mothers.

While these studies represented a shift in the conceptualization of the dyadic interaction process, the basic underlying model remained linear. Progress made at this point could only be reckoned in terms of balance, namely, the study of child effects had become as equally important as the study of parental effects. Nevertheless, one obvious logical or intuitive implication of the body of findings generated by the *child-effect* studies was that handicapping condition or child developmental status could potentially make a difference in the interaction patterns of mothers of handicapped and nonhandicapped children. It is not a matter of coincidence, then, that comparative studies of mothers' interactions with handicapped and nonhandicapped children have proliferated over the past decade and a half.

Since the mid-seventies, an interactional view of parent-child relationships has emerged. For example, following their extensive review of the literature on the effects of "reproductive casualty" and the "caretaking environment" on later developmental outcomes, Sameroff and Chandler (Sameroff, 1975, 1980; Sameroff & Chandler, 1975) have pointed out that the *main effect* model which views later developmental outcome as a function of any single major variable is at best parochial. They proposed that a transactional model is more appropriate for understanding developmental outcomes. The transactional model postulates a continual and progressive interaction between the organism and its environment. The child's response is more than just a simple reaction to the environment; it should be seen in the light of its power to affect and restructure the environment.

The transactional model relied on support from detailed observations of mothers and their children—the sequence of their conversations, eye contact, touching, play interactions, etc. This increasing emphasis on micro-analytic studies represents another remarkable shift in the conceptualization of the mother-child interaction process. There has been a major movement away from interest in just how maternal or child behaviour is influenced by such

global constitutional and environmental attributes as temperament, sex, birth order, socio-economic status, and so on, to interest in the behavioural transactions that take place within the parent-child dyad in a given interaction context—e.g. during face-to-face, feeding, dressing, free play, and structured task interactions.

Under the general framework provided by the bidirectional (Bell, 1968, 1974) and transactional (Sameroff, 1975, 1980; Sameroff & Chandler, 1975) models, it soon became necessary for researchers to extend methods. Frequency counts of single infant or maternal behaviours were deemphasized and qualitative relationships between units or sets of infant and maternal behaviours (e.g. concurrent and sequential relationships) were described as streams of interaction. This is the view of the dyadic interaction process which Lewis and Lee-Painter (1974) have articulated in their transactional model. Dyadic interaction is more complex than the mere individual mother and child behavioural occurrences; both mother and child behaviours continually influence each other. The reciprocal nature of this interaction process demands, then, that we go beyond single behaviour counts to consider the extent to which an actor's behaviour is related to a partner's behavioural initiations and/or responses.

B. The role of mother-child interaction in child development

The growing interest in the study of interactions between mothers and their handicapped children is in part related to an increasing body of conceptual-theoretical and empirical literature suggesting that reciprocal interactions involving mothers and their infants play a crucial role in the child's cognitive, linguistic, and social development. For example, both Vygotsky (1962) and Luria (Luria & Yudovich, 1959) proposed in their theoretical analyses that intellectual development advances through dialogues between parent and child. The critical role of the parent in the context of this dialogue is one of mapping out for the child "the relevant and important dimensions of experience" (Hartmann & Haavind, 1981).

Empirically, a number of studies investigating the relationship between patterns of parental caregiving or interaction and sensorimotor competence in 'normal' infants and young

children have found early home environments and parental behaviour to be significantly related to infant cognitive and exploratory competence. For example, Bing (1963) found differences in patterns of cognitive ability among children to be related to maternal behaviour in a structured interaction situation, while Hess and Shipman (1965) found maternal teaching style in the context of daily mother-child interactions to be related to the child's cognitive functioning. In a more recent study, Belsky, Goode, and Most (1980) have examined the influence of maternal stimulation on infant play and exploratory competence utilizing a cross-sectional/correlational and an experimental design together.

Belsky and his associates defined maternal stimulation operationally as maternal efforts, both physical and verbal, to focus the infant's attention on objects and events within the environment. Physical attention focusing strategies included pointing or tapping something with her finger to draw the child's attention to it, demonstrating physically to the child how something worked, and moving the child's hand through the motions of an activity. Verbal attention focusing strategies, on the other hand, included instructions/questions, verbally highlighting unique properties of an object or event, and labelling. The major infant behaviour examined was independent, viusally guided manipulative exploration. Three specific levels of this behaviour were observed: *juxtapose* (putting togther two or more unrelated materials), *functional* (exploiting unique properties of an object), and *pretend play* (play that involved imagination). Three additional infant behaviours observed were: *extended exploration* (engaging in sustained exploration for entire 15-second period), *attend to mother*, and *imitate/ comply*.

The cross-sectional/correlational design sought to examine developmental trends in maternal and infant behaviour, and used 32 infants with 8 infants in each of the following age groups: 9, 12, 15, and 18 months. The experimental design sought to specifically evaluate the hypothesis that maternal attention-focusing behaviour enhances children's exploration. This design involved 16 one-year-olds divided equally into experimental and control groups. The experimental treatment consisted of 3 consecutive weekly visits to the home during which an

experimenter observed dyadic interaction, stopping the dyads at points to share observations with the mother and thus making mothers consciously aware of their own spontaneous stimulating activity. The effect of the intervention on maternal attention-focusing behaviour was measured one week after the intervention while the impact on the infant was measured 2 months later.

Overall, analyses of data from the two designs in this investigation demonstrated a strong relationship between parental interaction strategies and infant exploratory competence. Correlational analyses showed that infants who displayed the greatest exploratory competence had mothers who frequently focused their children's attention on objects and events in the environment. The results showed, further, that while both physical and verbal strategies were positively related to the infant's orientation toward the mother, it was physical attention-focusing behaviour that most strongly and consistently predicted infant play and exploratory competence. Finally, results of the experiment showed that experimental mothers significantly exceeded control-group mothers in the frequency of stimulation, while experimental infants engaged in more competent play than did control-group infants.

These findings are consistent with the results of Clarke-Stewart's (1973) study in which strong correlations were reported between maternal verbal, social, and nonphysical stimulation—e.g. looking—and measures of infant mental development. In fact the single best predictor of several measures of infant functioning—e.g. Bayley mental scores and complexity of free-play—was maternal stimulation of the infant with objects. In a more recent study, Jay and Farran (1981) have found patterns of mothers' interactions with their 36 month-old children to be predictive of the children's IQ at 60 months of age.

The assumption that parents, particularly mothers, serve as the principal mediators between the child and the external environment is applicable not only to general intellectual development but to language and social development as well (Bricker & Carlson, 1981; Bruner, 1977; Chapman, 1981; Snow, 1977). Bricker and Carlson (1981) have argued that a basic developmental continuity may exist between infants' prelinguistic communicative behaviour and

the onset of language. The authors define prelinguistic behaviour as referring to the early social transactions which take place between the infants and their caregivers. Thus, early infant behaviours, such as smiles, gestures, visual regard, and cries may precede and be related to the development of linguistic forms. The mother's role during this transition is very crucial, and is characterized by Bricker and Carlson (1981) as follows:

> *Beginning in early infancy, mothers help their babies focus on the salient features of cognitive, social, and linguistic environmental stimuli. By engaging in an "implicit pedagogy" (Bruner, 1975) in their everyday interactions with their babies, mothers are instrumental in teaching them transferrable skills that may be classified as precursors of language proper. (p. 494)*

The work of Bruner (1975, 1977) from which Bricker and Carlson have drawn heavily focused on the structure of joint activities and how this structure enables the child to learn rudimentary elements of grammar. Bruner viewed the first year of life as the period when the infant and the mother develop procedures for operating jointly in support of each other. Initially geared to assist and comfort, these procedures lead to the establishment of conventions and requirements about carrying out tasks together. These joint tasks may then shape the structures of initial grammar through the jointly held concepts they impose. For example, the infant learns the concepts and roles of *agent* (mother), *action* (e.g. give), *object* (toy), *recipient* (baby) through joint activity. Bruner speculated that later in the child's development words are substituted in these "action slots" (Spieker, 1982), implying, therefore, that grammatical rules are extensions of action rules the child acquires within the context of early social interaction. Thus, the development of rules and conventions for joint action in the social ambience of day-to-day dyadic (or triadic) interactions sets the stage for the infant's acquisition of grammar.

The linguistic models of early infant-mother interaction have been questioned on the grounds that the connection between systems of action schemes on the one hand, and formal rules of conversation and grammar on the other may be very remote (Spieker, 1982; Thoman & Freese, 1980). However, the general hypothesis that early parent-child interactions are important for language development has a great deal of intuitive appeal.

While Bruner's emphasis was on the structure of joint activity as a precursor to the acquisition of grammar, Snow (1977) stressed the implications of the *social* turn-taking involved in early joint activities (e.g. proto-conversations and give-and-take games). According to Snow, early mother-child interaction teaches infants their role as partners in social interchange. Learning the cadence and alternation of speech roles, a process which is certainly less abstract than the semantic and syntactic rules of communication, is that integral part of social interchange which the child learns through the early dyadic interaction process.

C. The Problem

The theoretical propositions and empirical evidence briefly reviewed above raise a number of pertinent theoretical and clinical issues regarding interactions between mothers and their handicapped children. First, the transitional period between Bell's (1968) work and the emergence of micro-level interactional and transactional models of parent-child interaction saw a proliferation of research studies which confirmed the effects of infant characteristics on maternal behaviour. These studies suggested, logically, that interactions between mothers and their handicapped infants and young children would be different from those between mothers and nonhandicapped children.

Second, empirical research with nonhandicapped children, mainly in the cognitive area, has confirmed theoretical speculations that the nature of the mother-child interaction process influences the child's developmental competence in several important ways. These two themes emerging from the conceptual-theoretical and empirical literature should naturally raise concerns about the quality of interactions between mothers and their handicapped children. In what ways do handicapped and nonhandicapped infants and young children differ in their interactions? How do mothers of handicapped children respond to the unique qualities their handicapped child brings to the interaction context? If mothers of handicapped children display unique interaction styles, compared to mothers of nonhandicapped children, in what ways do these unique styles affect the handicapped child's development—Are they facilitative, although

different, or are they disruptive of development? In what ways may mothers of handicapped children be helped to achieve patterns and styles of interaction that will be facilitative of development?

The present study is an attempt to explore the nature of interactions between mothers and their mentally handicapped infants and young children, and to compare such interactions with those between mothers and their nonhandicapped infants and young children. The study is unique in three important ways. First, it utilizes a dual comparison procedure—both chronological age (CA) and mental age (MA) comparisons—in an attempt to tease out the effects of the child's handicap upon his/her mother's behaviours. In this study CA refers to the child's real age in months calculated from the date of birth while MA, assessed on the Bayley Scales of Infant Development (Bayley, 1969), is used as an index of general level of cognitive development. The rationale for the dual comparison procedure, and for the inclusion of the MA comparison group in particular, is explained in detail in Section E of the next chapter.

Second, the study employs a short-term longitudinal design: (a) to examine the impact of participation in an early intervention program on the interactions of mothers and their mentally handicapped children; (b) to analyze changes in patterns of interaction over time; and (c) to explore the extent to which patterns of group differences observed between mother-handicapped and mother-nonhandicapped child dyads remain stable across time. Finally, the study examines dyadic interation data from a quantitative as well as a qualitative perspective. Frequency analyses of separate maternal and child behaviours provided a quantitative picture while analyses of sequential dependencies between mother-child behaviour pairs at lag 1 provided indices of quality of interaction.

II. REVIEW OF THE LITERATURE

In the course of preparing this dissertation a paper based on a review of the conceptual, methodological, and empirical literature on interactions between mothers and their mentally handicapped infants and young children was submitted to the *Journal of Applied Developmental Psychology* and subsequently accepted for publication (Marfo, 1984). This chapter is basically a revised and expanded version of the empirical studies reviewed in that paper.

The chapter is organized under four sections. Sections 1 and 2 examine research findings on the characteristics that children and their mothers respectively bring into the interaction process. In section 3, the dyad is examined as a unit, and research comparing dyads with mentally handicapped and nonhandicapped children is reviewed with regard to quality (degree of reciprocity and synchrony) of interaction. Section 4 reviews studies reporting intervention procedures and their effects on the quality of interactions between mothers and their mentally handicapped children.

A. Mentally handicapped versus nonhandicapped infants and young children

One general hypothesis often tested in studies comparing the interactions of chronological age-match mentally handicapped and nonhandicapped children and their mothers is that patterns of interaction will differ between the two populations. This hypothesis is itself based on the deduction that the unique developmental characteristics of mentally handicapped children diminish the role of these children in the interaction process, and thereby cause their mothers to respond to them in ways that are different from the responses of mothers to their nonhandicapped children.

Evidence emerging from several recent studies, mainly comparing Down[1] syndrome (DS) and nonhandicapped infants, has demonstrated that mentally handicapped infants show: (a) difficulties in referencing objects in their environment; (b) a delay in the development of vocal behaviour; (c) a deficiency in early attention and speech discrimination skills; and (d) a

[1]The author prefers the label Down syndrome to the more conventional "possessive" label, Down's syndome.

deficiency in the processing of complex auditory information.

Looking behaviour: Jones (1980) and Gunn, Berry, and Andrews (1982) compared DS and nonhandicapped infants on two types of looking behaviour—social/interpersonal looking and referential eye contact. The former involved mother and infant looking at each other while the latter was used to define the mother's and/or infant's visual referencing of an environmental object/event outside the dyad. Jones matched 6 DS and 6 nonhandicapped infants on age, sex, and level of mental development and reported that while DS infants showed more social eye contacts than nonhandicapped infants, they exhibited a marked deficiency in referential eye contact. The finding regarding social looking behaviour is consistent with earlier work reported by Buckhalt, Rutherford, and Goldberg (1978) in which CA-matched 9- to 18-month-old mentally handicapped and nonhandicapped infants showed no difference in their visual regard of mother.

Gunn et al. (1982) compared referential looking behaviour in 6-month-old nonhandicapped and 9-month-old DS infants (whose Bayley mental scores showed a developmental age close to 6 months). At age 6 months, nonhandicapped infants looked away from their mother and at some aspect of their environment 70% of the time; the DS infants, however, did not approach this amount of referential looking even at age 9 months.

Vocal behaviour and conversational response skills: Buckhalt et al. (1978) found that mentally handicapped infants vocalized less frequently than nonhandicapped infants, while Jones (1980) reported that the vocalizations of DS infants tended to be more repetitive and to run together more often than those of nonhandicapped infants. In a more recent study, Berger and Cunningham (1983) compared the vocalization profiles of DS and nonhandicapped infants under two stimulus conditions—mother talking and mother silent—during face-to-face interactions observed over the first 6 months of life. DS infants showed significantly lower levels of vocalization during the first four months of development.

A second finding of interest in the Berger and Cunningham study was that once DS infants started to catch up during the fourth month, their vocalizations continued to increase

over a long period of time and "did not show the decline seen in nonhandicapped infants by the fifth and sixth months" (p. 225). While the vocal output of nonhandicapped infants declined after the fourth month in the talking but not the silent condition, DS infants showed a steady increase in vocal output under both conditions. Berger and Cunningham have suggested that the profiles of the nonhandicapped infants are consistent with findings from other research (e.g. M.M. Lewis, 1959) pointing to a quiescent stage in the development of early social vocalizations around 4 to 9 months during which period infants show a transition from a more or less automatic vocal responding toward more active listening and discrimination of speech. This evidence would suggest that in DS infants the onset of the quiescent stage may be delayed.

Leifer and Lewis (1984) examined the conversational response skills of young DS and nonhandicapped young children in their recent study. A group of 4 nonhandicapped infants (mean CA=20.8 months) was matched with a group of 4 DS infants on chronological age (mean CA=20.5 months) and with a group of 6 older DS children (mean CA=48 months) on expressive language ability as measured in terms of mean length of utterance (MLU=1.0). The results of this study showed that same-language-level (chronologically older) mentally handicapped children exhibited a significantly greater number of appropriate responses to maternal questions than did both the nonhandicapped infants and their same-age handicapped match. The nonhandicapped infants made significantly more appropriate responses than DS infants of similar CA.

When the three groups were compared on number of inappropriate responses, the same-age DS infants produced significantly more inappropriate responses than did either the nonhandicapped or same-language-level DS children. The same-age handicapped group also produced the least number of vocalization responses. These findings suggest the following: (1) that the conversation response abilities of mentally handicapped infants are developmentally delayed; (2) chronologically older mentally handicapped children functioning at the same linguistic level as chronologically younger nonhandicapped children do not necessarily have the same conversational response skills; in fact, mentally handicapped children at the one-word

stage of syntactic development exhibited superior conversational response skills than younger nonhandicapped children at the same level of syntactic development. Leifer and Lewis (1984) have discussed these findings in relation to the developmental delay vs difference controversy.

Speech discrimination and processing of auditory information: In the Berger and Cunningham (1983) study referred to earlier, it was reported also that nonhandicapped infants' vocal output in the first 3 months of life was significantly higher in the talking than in the silent condition; however, the pattern was reversed by the sixth month, "suggesting a suppressing effect of maternal speech on the infant's vocal output" (p. 338). That this reversed pattern was not true of the DS infants, according to Berger and Cunningham, may be indicative of delays or deficiencies in DS infants's attention, listening, and discrimination skills.

An earlier study by Cunningham and his associates (Glenn, Cunningham, & Joyce, 1981) examined the selective listening ability of DS and nonhandicapped infants given a nursery rhyme sung by a human voice and the same ryhme played on musical instruments (repetitive tone). Eleven infants with DS (mean CA = 12.7 months; mean MA = 9.3 months) were matched for MA, number of siblings, and social class with 11 nonhandicapped infants (mean CA and MA = 9.3 and 9.6 months respectively). The results of the experiment showed that both DS and nonhandicapped infants demonstrated a significant preference for nursery rhymes sung by a human voice, and did not differ on their responses to the repetitive tone either. However, DS infants showed significantly longer response durations to the sung rhymes than did the nonhandicapped infants. The two groups of infants did not differ on response frequency, however. Glenn et al. (1981) interpreted the DS infants' longer response durations on sung nursery rhymes as reflecting difficulty in processing more complex auditory information.

In a second experiment, Glenn and Cunningham (1983) compared 10 of the 11 DS infants in the first experiment (Glenn et al., 1981), 12 months later, with 10 nonhandicapped infants also from the previous study (the nonhandicapped infants were tested 5 months earlier to ensure that the two groups were developmentally matched). In this second experiment, the infant's responses to baby talk (BT) and adult talk (AT) were measured in addition to the

variables from the first experiment. The results of this experiment were consistent with those found in the first experiment; both groups of infants showed a significant preference for sung rhymes over the repetitive tone, and did not differ from each other on frequency of response to the rhyme. However, DS infants showed a higher response duration to the sung rhymes than did the nonhandicapped infants, leading the researchers to conclude that "it is the processing of the complex auditory stimuli that accounts for the longer durations of responding in the handicapped group" (p. 336).

Studies of older infants' and young children's interactions

Vocalization, eye contact, and looking behaviour in general constitute powerful communicative and linguistic signals in the dyadic interaction process (Schaffer, Collis, & Parsons, 1977). Thus, the evidence to the effect that DS infants show a delay in the development of vocal behaviour, a deficiency in early attention and speech discrimination skills, and difficulty in referencing objects in their environment may provide a partial explanation for the disruption of the mother-handicapped child interaction process reported in many of the studies under review. Several studies involving toddlers and older children have provided some evidence of continuity between these early precursors and later interaction disturbances. While some caution must be exercised in interpreting these reported differences because of design and methodological problems (e.g. small sample sizes; limited sampling of dyadic interaction; preponderance of data from free play and structured task interactions over data from more spontaneous interaction situations such as feeding and dressing), the consistency of findings across designs (CA- vs MA-match) would appear to strengthen these findings.

Marshall, Hegrenes, and Goldstein (1973) compared CA-matched retarded and nonhandicapped 3- to 5-year old children on four verbal operants: (1) mands (demanding, commanding, requesting, and asking); (2) tacts (labelling, naming, or describing as verbal responses to stimulus); (3) intraverbal responses (responses which are made under verbal stimuli but which have no point-to-point correspondence with them); and (4) echoics (repetition of responses made by another). Their findings are consistent with results reported

on younger children in the Jones (1980) study. Marshall et al. found that while nonhandicapped children emitted significantly more tacts, mands, and intraverbals, the mentally handicapped children produced significantly more echoic behaviours. These results suggested that handicapped children made fewer verbal demands of their mothers and responded less appropriately during interactions.

In the only study examining both dyadic (mother and child) and triadic (mother, father, and child) interactions, Stoneman, Brody, and Abbott (1983) observed 4- to 7-year-old CA-matched DS and nonhandicapped children during free play interactions with their parents. Nonhandicapped children assumed an active playmate role with parents more frequently and exercised more control over play interactions than did DS children. These results are consistent with the findings from two studies in which mentally handicapped and nonhandicapped children were matched for cognitive level. Cunningham, Reuler, Blackwell, & Deck (1981) observed the interactions of MA-matched mentally handicapped and nonhandicapped children in free play and structured task situations. Although the two groups of children were equally compliant to maternal commands, handicapped children proved less interactive, less responsive, and spent more time in solitary play than nonhandicapped children. In another recent study, Eheart (1982) matched 8 mentally handicapped and 8 nonhandicapped children on cognitive level and found the handicapped children to initiate significantly less interactions than nonhandicapped children.

In summary, mentally handicapped children are reported in these studies to be less active, less responsive, and more echoic during interactions with their parents. Studies of younger infants point to early delays and deficiencies in vocal production, speech discrimination, and referential looking skills as possible early precursors to the difficult interactions observed among older infants and young children.

B. Mothers of mentally handicapped and nonhandicapped children

Two central themes can be summarized from the findings reported on the interaction styles of mothers of the two categories of children. These themes are: (a) the nature of maternal linguistic input to children, and (b) the degree of control and directiveness found in the interactions of the two categories of dyads.

Maternal linguistic environment: Perhaps no single issue has generated as much debate and research in the literature on interactions between mothers and their mentally handicapped children as the question regarding the quality of maternal linguistic environment available to DS infants and young children. The study which triggered off this debate was reported by Buium, Rynders, and Turnure (1974). CA-matched DS and nonhandicapped infants were observed in interaction with their mothers on structured tasks in a laboratory setting. When conversations were analyzed, DS children were found to be exposed, among others, to: (1) a higher number of utterances; (2) a lower mean length of utterance (MLU); (3) a higher number of sentences but lower mean length of sentences; (4) a higher frequency of grammatically incomplete sentences; and (5) a higher frequency of single word sentences. On the basis of these findings, Buium et al. concluded that mothers of DS children provided their children with linguistic input that was different from and more deficient than those available to nonhandicapped children of similar CA, and implied in their discussion that the deficient linguistic environment of Down syndrome children was in part responsible for their language incompetence.

The Buium et al. study and the reactions of other researchers illustrate some of the problems in interpreting findings of research in this area. The critical issue here was the appropriate variable for matching mentally handicapped and nonhandicapped groups in studies that sought to compare children's effects on maternal behaviour. For example, Buium et al. failed to consider an alternative explanation for the observed differences between the two groups of mothers, namely mothers' recognition of the DS child's lower level of functioning may have led them to regulate speech in ways that, although different, may be facilitating communication

and learning, particularly for younger children. Studies of normal language development in the early years have shown, for example, that adult speech addressed to infants tends to be characterized by reduced rate (Broen, 1972), simplified syntax (Baldwin & Baldwin, 1972; Broen, 1972; Newport, 1976), and discourse redundancy (Broen, 1972). Thus what Buium et al. (1974) found was what mothers of developmentally younger children would generally do and could therefore not be described as representing deficient linguistic input.

Subsequent studies on this subject have attempted to address the linguistic input issue in relation to the child's level of mental and/or linguistic functioning. Although Buckhalt et al. (1978) also matched DS and nonhandicapped children on CA and observed dyadic interactions in a laboratory setting, they utilized a correlational analysis to examine the relationship between maternal linguistic behaviour and the child's level of functioning. This study, like the Buium et al. study, found a higher number of maternal utterances in the DS group. However, the high positive correlations observed between frequency of maternal utterances and the infant's MA in both groups suggested that mothers made more utterances to high MA infants. Mothers' MLU in both groups was found to correlate positively and significantly with infants' MA. Moreover, mothers' overall vocalizations correlated positively with CA in the nonhandicapped group and to MA in the DS group, indicating that mothers in both groups talked more to older and more competent infants.

Two other studies utilizing home observations matched DS and nonhandicapped groups on MA as well as on level of language functioning and reported findings similar to those made in the Buckhalt et al. study. Rondal (1977) found no differences between the two groups of mothers on various aspects of maternal speech, including total number of words produced, MLU, different types and subtypes of sentences (e.g. declaratives, imperatives, etc.) and grammatically incomplete sentences, attentional utterances, mothers' exact repetitions of their own utterances, proportions of expansions and corrections of children's speech, mothers' repetition of children's utterances, etc. In contrast to the absence of DS versus nonhandicapped group differences, Rondal found that several characteristics of maternal speech varied

significantly as a function of the child's level of language functioning, regardless of the child's diagnosis. Rondal suggested that the children's level of language functioning, rather than their diagnostic status (i.e. handicapped or nonhandicapped), was a more powerful variable influencing maternal speech.

O'Kelly-Collard (1978) matched DS and nonhandicapped children on MA, receptive language age (RLA), and expressive language age (ELA) and reported no differences in the characteristics of maternal speech directed at DS and nonhandicapped children. She found that in both groups, rate of speech was slow as shown in low MLUs and high proportions of single word utterances.

In the Glenn and Cunningham (1983) study referred to in the first section, recordings of mothers' "baby talk" (BT) to their children and "adult talk" (AT) to the experimenter were analyzed for rate of speech—number of words per minute (*wpm*)—and MLU. No differences were found between mothers of DS and nonhandicapped infants in either rate of speech or MLU for both BT and AT. Mothers of DS infants talked at a mean rate of 86.3 *wpm* (3.1 MLU) in BT and 164.2 *wpm* in AT, while mothers of nonhandicapped infants talked at a BT rate of 83.7 *wpm* (3.3 MLU) and at an AT rate of 168.7 *wpm*.

The methodological strength of the Buckhalt et al. (1978), Glenn and Cunningham (1983), O'Kelly-Collard (1978), and Rondal (1977) studies, compared to the Buium et al. (1974) study, lies in the fact that they considered the child's level of mental and/or linguistic competence as an important variable influencing the behaviour of mothers towards their children. These studies demonstrated that at least some of the differences found between mothers of DS and nonhandicapped children in CA-match studies may have been artifactual rather than true differences.

Among the studies which controlled for the child's level of mental or language ability, only one (Davis & Oliver, 1980) has reported evidence suggesting that differences in the linguistic input provided by mothers of mentally handicapped and nonhandicapped children may not necessarily be a function of the child's level of functioning. Comparing the

verbalizations of mothers of 8 mentally handicapped (mean CA=41 months) and 8 nonhandicapped (mean CA=12 months) children, Davis and Oliver (1980) reported that mothers of handicapped children made significantly more frequent utterances, were significantly much less directive in their speech, and were more responsive in terms of more frequently and quickly replying to an utterance from the child. On the basis of these findings, Davis and Oliver invoked Kelly's (1958) theory of attribution to argue that "it is not the behaviour of the retarded child that makes the mother behave differently, but the way she construes the child" (p. 142). Thus according to Davis and Oliver, construing the child as 'handicapped' or 'retarded' was the important determinant of maternal linguistic input regardless of the child's actual behaviour and general ability.

The six studies reviewed above, however, share a common problem; maternal speech cannot be completely characterized independent of the topics selected for conversation. Maternal speech is only one, though an important, aspect of the child's linguistic environment. For example, the kinds of games or toys that mothers use with their children are a good part of the child's linguistic environment. This aspect of the child's environment has been examined in one study (Cook & Culp, 1981). Matching DS and nonhandicapped infants on cognitive and language ability, Cook and Culp studied mutual play behaviour in the home setting. Given a choice to use any or all of 9 prescribed toys, mothers in the two groups did not differ in the number or type of toys presented to their children. Both groups of mothers tended to show a preference for toys which produced language when manipulated in an appropriate way by the infant (e.g. talking dolls).

The evidence from these studies suggests the following. First, mothers of mentally handicapped children may not be different from mothers of nonhandicapped children in recognizing the need to regulate speech according to the child's level of functioning. Second, CA-match studies may conceal this similarity between the two groups of mothers; it is only when maternal linguistic input is considered in relation to the child's level of mental and/or language competence that this similarity emerges. The results of the Davis and Oliver (1980)

study, however, suggest the need for further examination of this question through adequately controlled studies. Finally, it is probably not fruitful to isolate evaluations of mother's linguistic input from the developmental characteristics of the child, or from the environmental referents for their conversations.

Maternal control and directiveness: Although mothers of developmentally delayed children may not be any different from mothers of nonhandicapped children in their regulation of speech to match their child's level, the finding that they tend to be more controlling and directive appears to be supported in both CA- and MA-match studies examining this aspect of the mother-child interaction process. Two sets of maternal behaviour have generally been used to index control and directiveness: (1) commands, command questions, and orders; and (2) lead taking in play interactions.

In the Marshall et al. (1973) study mothers, like their children, were compared on the four verbal operants—mands, tacts, intraverbals, and echoics. While the two groups of mothers did not differ on the frequency of tacts, intraverbals, and echoics, mothers of handicapped children showed a greater frequency of mands (demanding, commanding, requesting, asking). These findings were consistent with the results of an earlier study (Kogan, Wimberger, & Bobbitt, 1969) in which mothers of 3- to 7-year-old mentally handicapped children were found to give more orders and to ask more leading questions than mothers of 4- and 5-year-old normal comparison children.

More recent research has provided further confirmation for the above findings. Cunningham et al. (1981) reported that mothers of mentally handicapped children gave more commands and extended more control over the play of their children than mothers of nonhandicapped children. Breiner and Forehand (1982) also have used the frequency of commands as an index of control. They found mothers of 4- to 5-year-old mentally handicapped children to be more controlling than mothers of CA-matched nonhandicapped children. Eheart (1982) has reported that mothers of mentally handicapped children in her study used nearly three and a half times as many directives as did mothers of nonhandicapped children, while

Stoneman et al. (1983) found mothers of mentally handicapped children to be significantly more verbally and nonverbally commanding than mothers nonhandicapped children.

Lead taking in play interactions was used to index control in several studies. Jones (1980) examined mothers' style of interaction using Bruner's (1975) two categories: the tendency of mothers to direct play activity versus the tendency to let children take the lead while just providing support. Jones reported that mother-directed sequences occurred more frequently in the DS group than they did in the nonhandicapped group. Conversely, the nonhandicapped group showed a higher frequency of child-directed sequences than did the DS group. Similar patterns of play interactions were reported in the Eheart (1982) study; in interactions between mothers and their nonhandicapped children, significantly more interaction took place around toys introduced by the children than around mother-introduced toys. A reversed trend, although not statistically significant, was true of the play interactions of mother-handicapped child dyads. These findings are consistent with results reported in the Kogan et al. (1969) study—mothers of nonhandicapped children played in a responsive manner to child-directed interactions about 4 to 5 times as frequently as mothers of handicapped children.

It is significant to note that of 7 studies reporting data on maternal control and directiveness, three (Cunningham et al., 1981; Eheart, 1982; Jones, 1980) matched handicapped and nonhandicapped children on level of cognitive functioning and still reported findings similar to those reported in the CA-match studies (Breiner & Forehand, 1982; Kogan et al., 1969; Marshall et al., 1973; Stoneman et al., 1983). That mothers of handicapped children are found to be more controlling and directive even when their children are matched on level of cognitive functioning has generally been taken as an indication that there is something uniquely difficult about mother-handicapped child interactions. Perhaps the label 'retarded' associated with the child leads a mother to regard the child as always requiring assistance and direction regardless of his/her relative level of competence.

This interpretation must however be taken tentatively for two reasons. First, it is conceivable that the mental age matching employed in the Cunningham et at. (1981) and Jones (1980) studies and the criterion (level of play behaviour) matching used by Eheart (1982) may not have adequately equated the handicapped and nonhandicapped children for the behavioural difficulties they presented. Second, evidence from one well controlled study suggests some caution in adopting the above interpretation. Terdal et al. (1976) compared 42 mentally handicapped and 40 nonhandicapped children matched at three levels of mental development—low MA, mid MA, and high MA. These researchers found mothers of lower functioning or developmentally younger children to be more directive than mothers of high functioning and older children in both handicapped and nonhandicapped groups. As Terdal and his associates pointed out, this finding may suggest that mothers generally respond to inadequate responding from their children by increasing structure and control, regardless of the child's diagnostic condition.

An important question which the findings of the above studies raise is: how does controlling behaviour or directiveness on the part of the mother affect the mentally handicapped child's development of competence? So far only one study has attempted to address this question directly. Herman and Shantz (1983) examined the hypothesis that mothers of mentally handicapped children who engage in less restricting, less interfering, and less directing behaviours with their child will have children with higher social problem-solving skills than mothers who engage in more directive behaviours.

Twelve mild mentally handicapped and 19 nonhandicapped 10-year-old children and their mothers were videotaped in three interactive contexts: (1) during free play; (2) during a cooperative task of the mother and child each controlling one knob of an *Etch-a-Sketch* to reproduce three designs; and (3) during a teaching task requiring the mother to teach the child how to perform a magic trick. Two broad behaviour categories—directives, and the extent to which mother played interactively and encouraged problem solving—were derived from several single maternal behaviours. The children's ability to solve social problems was assessed using

the *Alternative Solutions to Problems* task (Spivack & Shure, 1974) while their overall social competence was assessed using the *Vineland Social Maturity Scale*.

Herman and Shantz (1983) confirmed the finding that mothers of mentally handicapped children tend to be more directive than mothers of nonhandicapped children of similar CA. More importantly, however, they found a significant negative correlation ($r = -.66$) between maternal directiveness and the number of different solutions provided by handicapped children. Thus mentally handicapped children who provided the least number of solutions had mothers who were more directive. There was also a significant positive correlation ($r = .49$) between the extent to which mothers played interactively or encouraged problem solving and the handicapped children's problem solving ability. When IQ differences between handicapped and nonhandicapped children were partialled out, this correlation remained significant.

If the findings of Herman and Shantz (1983) are replicated in future studies, especially in studies which control for the children's level of mental functioning, the issue of maternal directiveness among mothers of mentally handicapped children would assume even a more crucial significance.

C. Within-dyad reciprocity and synchrony

The expression *quality of interaction* is used in this dissertation to describe the degree of symmetry or asymmetry that characterizes patterns of dyadic (or triadic) interactions. The concepts synchrony, turn taking, compliance, and responsiveness have been used in the literature to characterize the extent to which the behaviours of one member of the dyad relate to preceding, concurrent, or subsequent behaviours of the other member. The evidence from several studies indicates clear qualitative differences in the interactions of mother-handicapped and mother-nonhandicapped child dyads.

Buckhalt et al. (1978) reported that not only did mentally handicapped children vocalize and smile less frequently but more importantly, while the vocalizations of nonhandicapped infants occurred typically in interactions with their mothers, DS children's

vocalizations were more asynchronous to their mothers' activity. Jones (1980) also reported a consistent tendency for DS infants to vocalize with lesser consideration for their role in vocal dialogue. Further confirmation of these findings has been reported in the Berger and Cunningham (1983) study. These researchers monitored turn taking patterns of dyadic vocal interactions in the first 6 months of the infant's life and reported that with age, mother-DS infant dyads became less successful at mutually adapting and regulating their vocal behaviour than mother-nonhandicapped infant dyads were.

Regarding play interactions in general, Kogan et al. (1969) found that while mothers and their nonhandicapped children took turns with each other very often, mothers and their mentally handicapped children "did nothing together" more often than they did any other activity. Results from the Jones (1980) study confirm this pattern; although mothers of DS infants involved their children in more interactive events than comparison mothers, these interactions included a large number of failed invitations (mother's questions or directives to which the child did not respond). Thus the play interactions of mothers and their mentally handicapped infants were characterized more by asymmetry than turn taking. The asymmetry seems to be a result of the child's passively terminating the interchange.

In three studies, the quality of interaction was assessed by the degree of compliance to maternal instructions, and the nature of maternal responses to children's compliance. Both the Cunningham et al. (1981) and the Breiner and Forehand (1982) studies found no difference between nonhandicapped and mentally handicapped children on compliance. Breiner and Forehand found handicapped children to be less compliant than their nonhandicapped CA- and sex-matched comparison only under situations when mothers issued vague and interrupted commands. Interestingly, they reported further that mothers of handicapped children issued four times as many vague and interrupted commands as mothers of nonhandicapped children. On clear commands, however, the two groups of children showed similar levels of compliance.

Mothers of handicapped children, however, appear to differ from mothers of nonhandicapped children in their responses to children's compliant and noncompliant

behaviour. For example, Cunningham et al. (1981) found that mothers of handicapped children were less likely to respond positively to cooperative behaviour. Terdal et al. (1976) have reported data on the positive and negative consequences of noncompliant and compliant behaviour. They showed that mothers of mentally handicapped children provided poorly differentiated consequences to appropriate and inappropriate behaviour. Among all three groups of the handicapped sample, mothers provided nearly as much positive responses to noncompliant behaviours as they did to compliant behaviours. Among the three nonhandicapped groups, however, mothers were at least four times as likely to provide positive feedback for compliant behaviour than for noncompliant behaviour. This failure on the part of mothers of handicapped children to respond differentially would appear to be consistent with the view that these mothers may show greater preoccupation with eliciting more active participation than with the appropriateness of specific behavioural initiations and/or responses.

Some evidence exists to the effect that the degree of responsiveness within dyads is a function of the nature and severity of the child's handicap. Vietze, Abernathy, Ashe, & Faulstich (1978) found that although mentally handicapped children as a group showed less contingent responding to mothers' vocalizations, higher functioning handicapped children were more likely to initiate a vocal response that was contingent upon the mother's vocalization than lower functioning handicapped children. Terdal et al. (1976) demonstrated that the degree rather than just the condition of retardation determines how interactions between mothers and their children are affected. They reported that their more severely delayed children provided the least adequate responses to maternal behaviours. Cunningham et al. (1981) found children in the high MA groups (both handicapped and nonhandicapped) to be more responsive to maternal questions and more compliant to maternal commands than children in the low MA groups. Mothers' responsiveness to their handicapped children appears to be influenced by the severity of the child's handicap too. Vietze et al. (1978) found that mothers of higher functioning mentally handicapped children tended to respond more contingently over all interactions whereas mothers of lower functioning delayed children tended to be more diffuse

and showed a higher probability of responding whether their child was responding or not.

The findings reviewed in this section reveal two dimensions of the mother-handicapped child interaction process. As a group, mothers and their handicapped children portray less mutuality and synchrony in their interactions, but more importantly, the extensiveness of the disruption appears to be related to the severity of the child's retardation. The within-group differences found between lower and higher functioning handicapped children and their mothers provide further validation for the between-group (handicapped vs nonhandicapped) differences in the quality of interactions reported in the literature under review.

D. Interventions into mother-child interactions

Very few studies have specifically examined the effects of some form of dyadic or family intervention on the mother-child interaction process. While the current conceptualization of mother-child interaction is one that views the process as a bidirectional, reciprocal relationship, intervention in the studies reviewed in this section focused on the easier-to-teach partner, the mother.

Seitz (1975) used graduate student models to train mothers towards more effective interactions with their young children. One hour training sessions were held three consecutive days per week for 8 weeks. Mothers observed through a one-way mirror as graduate student therapists played with their children. The student therapists had been trained to: (1) comment on the children's activities; (2) reflect and expand the children's utterances; (3) engage the children in conversation; and (4) join them in their play. The experimenter offered positive reinforcement to the student therapists in the presence of mothers for appropriate interactions with the children. During the last three weeks, mothers replaced the student therapists. Results of the program showed modifications not only in mother but also in child behaviour. Mentally handicapped children's rate of compliance rose significantly from 43% to 98% and their imitations of mothers' utterances showed significantly longer MLUs. Their mothers increased their rate of positive responses to the child's independent play from 29% to 73%. Mothers also

demonstrated significant increase in imitations and expansions of the children's vocalizations.

Mash and Terdal (1973) trained mothers of mentally handicapped children to use behavioural techniques and learning principles to generate effective play with their children. A primary goal of the training program was to decrease mothers' directiveness and control in the form of commands and to increase interaction. During training, videotape replays of actual parent-child interactions were used to enable therapists to identify concepts of positive reinforcement, extinction, modelling, etc. Two of the one-hour sessions were spent teaching effective play behaviour while 8 sessions were spent discussing basic principles of behaviour modification as they related to noncompliant behaviour, self-help skills, and communication. The results of the study revealed an overall decrease in the percentage of commands and command questions issued during free play in all 5 training groups. Decrease in maternal commands and questions was shown to be accompanied by an increased overall compliance behaviour from the children. Parent training also resulted in increased amounts of interaction from mothers accompanied by an increased tendency for the children to reciprocate by interacting. Interactions in the non-training comparison group remained problematic.

Kogan (1980) has reported positive results from her training program that exposed mothers of developmentally delayed children to videotaped interactions of mother-child dyads and followed up video observation with a practicum during which mothers were prompted through a *bug-in-the-ear*. When the generalized impact of parent training on interactions was analyzed, twelve positive changes were observed in the interactions of the experimental group dyads compared to only 3 in control group dyads.

Finally, Marfo, Kysela, Barros, & Hillyard (1981) have reported the generalized and indirect effects on mother-child interactions of training mothers in the use of behavioural strategies to teach their developmentally delayed infants. Mothers were trained in the use of direct and incidental teaching strategies to teach cognitive, language, self-help, and social skills to their children. The training was not aimed at modifying dyadic interactions; however, the acquisition of the behavioural teaching strategies by mothers was expected to influence their

day-to-day interactions with their children. Six to 7 months after parent training, dyads exhibited greater synchrony in their interactions. Infants' play activity and mothers' stimulation of play were found to occur together more often. Other qualitative changes included increased co-occurrence of: infants' play activity and mothers' verbal stimulation; infants' positive mother-directed behaviours and mothers' positive emotion; and infants' positive mother-directed behaviours and mothers' physical guidance.

These studies, while utilizing varying forms of interventions, suggest that it is possible to remedy problematic mother-child interactions through a program of manipulation that focuses on the adult member of the dyad.

E. Summary of review and rationale for the present study

Two distinct findings emerge from the preceding review. Taken together, both findings, underscore a central methodological issue in the design of comparative studies of parent-child interactions. First, there is overwhelming evidence from CA-match studies that general behavioural interactions between mothers and their mentally handicapped children are different in various respects from mother-nonhandicapped child interactions. This evidence portrays the mother-handicapped child dyad as exhibiting a number of interactive problems. Essentially, while mentally handicapped infants and young children tend to be generally inactive and unresponsive, their mothers tend to be overactive and directive. The quality of dyadic interaction in this population tends to be characterized more by role asymmetries than by balanced mutual interchange. This finding raises a critical design question. There has always been the temptation to imply from CA-match studies that overactivity and directiveness are unique interactive characteristics of mothers of mentally handicapped children. The question which remains to be resolved is: Is the tendency for mothers of mentally handicapped children to be overactive and controlling in their interactions a function of having a handicapped child *per se*, or of having a child who although chronologically older is behaving or functioning at a younger developmental age level?

To resolve the above questions a research design is required which controls for children's general level of ability or competence. Mentally handicapped and nonhandicapped children of similar chronological age are different in several developmental characteristics and, in fact, several of the studies reviewed in the first section show unequivocally that mentally handicapped children exhibit different interactive skills from nonhandicapped children of similar CA. This means that handicapped and nonhandicapped children of similar CA will affect their mothers differently and, therefore, elicit different responses from them. Thus differences observed between mothers of same-age handicapped and nonhandicapped children may not be related so much to the presence or absence of a mental handicap in the child as to the child's level of development or competence regardless of diagnostic condition.

If it is the behaviour of the child and not the way he or she is perceived—as retarded or normal—which determines the mother's behaviour in a given interaction situation, then mothers of same-MA handicapped and nonhandicapped children should not differ in their interaction styles (assuming, of course, that these mothers are comparable on such other variables as level of education, family income, etc.). If they do, there would be a basis for arguing that such differences reflect the effect of the child's mental handicap on maternal behaviour.

Results from the few studies which utilized mental age controls in examining maternal directiveness are rather equivocal. Three of the studies (Cunningham et al., 1981; Eheart, 1982; Jones, 1980) reported findings similar to those found in the CA-match studies. However, a fourth study (Terdal et al., 1976) which involved the largest sample of all the studies reported (42 developmentally delayed and 40 nonhandicapped children) and matched children on three levels of mental age (low, mid, and high) found mothers of lower functioning or developmentally younger children to be more directive than mothers of higher functioning and older children in both handicapped and nonhandicapped groups. Thus it appears that what accounts for maternal directiveness is the nature of the child's behaviour—inadequate responding—and not the child's diagnostic status per se.

The second major finding emerging from the review lends further support to the last point. Studies focusing solely on the linguistic environment of DS children have indicated almost unequivocally that what appears to be a deficient maternal linguistic environment, when mentally handicapped and nonhandicapped children are matched on CA alone, is rather reflective of the tendency of mothers to regulate linguistic input to match their child's developmental level. In this regard, mothers of mentally handicapped children appear to be no different from all other mothers. It is instructive to point out that this apparent similarity between mothers of handicapped and nonhandicapped children emerged only from a series of studies which utilized mental age or linguistic ability controls.

One rationale for the present study is to tease out the effects of a child's mental handicap on his/her mother's interactive behaviour. The study is unique in its use of a design which utilizes a dual comparison procedure—both CA- and MA-comparison—to accomplish the above objective.

A second rationale for the study is related to procedures for measuring interaction. Dyadic interaction involving mother and child in a given context is best described as a continuous stream characterized by ongoing reciprocal feedback (Brooks-Gunn & Lewis, 1984; Thoman, 1981). Segmenting this stream for measurement purposes presents a major procedural problem. The majority of studies reviewed have examined more molecular aspects (i.e. specific behavioural units) of the mother-child interaction process. A second procedure has been to analyze conceptual aspects of the interaction process. In this approach, several specific maternal or child behaviours are combined into conceptually related molar categories. For example, in the general interaction literature, Clarke-Stewart (1973) used a principal components factor analytic procedure to cluster 23 infant and 26 maternal interaction variables into 5 infant and 6 maternal conceptual variables respectively. In the area of mother-handicapped child interaction research, Brooks-Gunn and Lewis (1984) have examined such conceptually related molar categories as proximal and distal behaviours through an intuitive combination of specific molecular behaviours of both mother and child. For example, the frequency of maternal

proximal behaviour represented the summation of frequencies on the following molecular behaviours: touch, kiss, hold, and seek proximity.

While these two approaches are adequate in terms of describing aspects of dyadic interaction, they do not provide the opportunity to examine it as a dynamic, reciprocal or transactional process. The need to pay greater attention to the dynamic aspects of the interaction process has been argued for many years. In the 70s, the response-class matrix as suggested by Mash, Terdal, and Anderson (1973) provided researchers with a tool for observing interactive behaviour codes created *a priori*. Several of the studies reviewed in this chapter utilized this procedure (Mash & Terdal, 1973; Seitz, 1975; Terdal et al., 1976). The major drawback of the response-class matrix was that only a small number of interactive behaviours could be studied at a time.

The development, in recent years, of the lag and sequential analytic techniques (Bakeman, 1978; Sackett, 1980) has made it possible to examine not only sequential but also concurrent relationships between the dyad's ongoing behaviours. Relatively few studies have used this procedure and other related micro-analytic techniques in comparing the interactions of mother-handicapped and mother-nonhandicapped child dyads (e.g. Marfo et al., 1981; Vietze et al., 1978).

No study comparing the interactions of handicapped and nonhandicapped children with their mothers has utilized all three procedures. The present study will examine the mother-infant interaction process utilizing all three appproaches; sequential dependency analysis based on molecular behaviours will be performed in addition to frequency analysis of both molecular and conceptual variables. It is anticipated that the unified picture obtained from combining the three approaches in one study will provide a much broader perspective for comparing not only the 'normal' and atypical dyads but also the intervention and nonintervention dyads.

Finally, by employing a short-term longitudinal design, this study will attempt to examine questions related to the following: (a) the relative stability of interaction variables over time; (b) the importance of duration in intervention in examining the impact of intervention on

mother-handicapped child interactions; and (c) the relationships that exist between child developmental variables and parent-child interaction variables across time.

F. Research questions and hypotheses

The general research questions to be explored in this study include the following:

- In what ways do mentally handicapped and nonhandicapped children of similar chronological age differ in their interactive behaviours?
- In what ways do mentally handicapped and nonhandicapped children of comparable mental age differ in their interactions?
- How do mentally handicapped children receiving early intervention differ from those not receiving intervention?
- How do mothers of mentally handicapped children in intervention differ from those who are not in intervention?
- What differences emerge between mothers of mentally handicapped and nonhandicapped children when their children are compared on the basis of similarity in (a) chronological age and (b) mental age?

The following hypotheses will be tested to elucidate the last research question:

- That differences observed between mothers of mentally handicapped and nonhandicapped children are due to mental age differences between the two categories of children.
- That mothers of mentally handicapped children differ from mothers of nonhandicapped children regardless of mental or chronological age comparability of their children.

III. METHODOLOGY

A. Subjects

Forty-five infant-mother dyads, falling into 5 equal groups of 9, served as the subjects in this study. Three of the groups had mentally handicapped (MH) or developmentally delayed (DD) infants, and were defined as follows: (1) a *nonintervention* group (MH and/or DD infant-mother dyads waiting to enter a home-based early intervention program); (2) a *short intervention* group (MH and/or DD infant-mother dyads who at the beginning of this study had been in an early intervention program for less than 6 months); and (3) a *long intervention* group (MH and/or DD infant-mother dyads who at the beginning of this study had been in an early intervention program for periods ranging from 6 to 10 months). The labels *nonintervention*, *short intervention*, and *long intervention* are used in this thesis to refer to the three groups of MH infant-mother dyads respectively. Infants in the these three groups manifested an average mental and motor delay of 5.4 and 6.7 months respectively on the Bayley Scales of Infant Development (BSID) and represented a wide variety of handicapping conditions: Down syndrome, fetal alcohol syndrome, cerebral palsy, brain damage, hydrocephaly, neurological impairment, and undiagnosed developmental disabilities.

Two groups of nonhandicapped infant-mother dyads served as control groups. Infants in Group 4 were chronologically younger nonhandicapped infants whose mental ages were similar to those of the MH infants in the first three groups, while infants in Group 5 were similar in chronological age to infants in the three MH groups. With the exception of two children in the nonintervention group (ages 25.9 and 29.5 months) and another in the short intervetnion group (age 25.9 months), all children in the study were between 4 and 24 months old.

The MH/DD infants and their mothers were subjects in a longitudinal research project exploring the efficacy of home-based early intervention in relation to child developmental progress and family interaction dynamics. The nonintervention dyads were drawn from that project's waiting list group of families from St. Paul and Camrose, while dyads in the two

intervention groups were drawn from program recipients from Athabasca, Calgary, Edmonton, Grande Prairie, and Lethbridge.

The nonhandicapped infant-mother dyads were not part of the longitudinal project referred to in the last paragraph. They were selected from a potential subject pool compiled from newspaper birth announcements by a researcher at the University of Alberta studying infant perceptual processes. Thirty-six families from the Edmonton area were selected for initial contact. The criterion for selection was to ensure that infants in half of the families had a mental age equivalent on the Bayley Scales similar to that of the infants in the three MH/DD groups, while the other half were of comparable chronological age as the MH/DD infants. The multiple group situation precluded a direct one-to-one matching of subjects in the 'treatment' and control groups.

Two letters, a separate one for mothers in each of the two nonhandicapped groups, were sent out to 24 of the 36 mothers. A week later, a female research assistant contacted each of the mothers by telephone to verbally explain the study, answer the parent's questions, and to seek a verbal response to the letter requesting her participation. The first round of letters and telephone interviews resulted in the recruitment of all but two of the subjects required. Two more families were later obtained from the reserve list.

B. Demographic and family characteristics

An obvious demographic variable which distinguished the nonintervention group from all the others was location—rural vs urban. The former group came largely from smaller towns/cities (Camrose and St. Paul), while most families in the other groups were located in bigger towns/cities (Calgary, Edmonton, Lethbridge). Despite this discrepancy, the groups were comparable on family income (Table 1). In all groups there were more boys than girls (69 and 31 per cent of total sample respectively); however, the ratio of girls to boys was higher for the nonhandicapped CA comparison group (4:5) than for the remaining groups (see Table 1).

Table 1. Characteristics of Infants and Family Income

	Nonint.	Short	Long	MA Comp.	CA Comp.
Ages (months)					
Mean CA	15.78	15.74	16.10	11.04	17.34
Mean Mental	9.82	9.92	11.66	11.72	
Mean Motor	10.86	7.80	9.00		
Children's Sex					
Male	7	7	6	6	5
Female	2	2	3	3	4
Family Income ($)					
Less than 10,000	0	1	1	0	0
10-20,000	3	4	4	2	3
20-30,000	3	2	2	2	2
30-40,000	2	1	1	3	2
over 40,000	1	1	1	2	2

C. The Intervention programs

Dyads in the two intervention groups came from several existing early intervention programs offered by various health units. Consequently, the researcher had no control over early intervention as an independent variable. The inclusion of these subjects in the study was considered important because of the opportunity it offered to examine the Province's home-based early intervention programs in relation to their potential impact on dyadic interactions. Although administered under different health units, the programs shared several common characteristics: (a) they were all provincially funded programs under Alberta Social Services and Community Health; (b) they were all home-based programs utilizing a parent training model; (c) they were mostly didactic in approach—i.e. program activities largely involved the mother as instructor of her own child; and (d) they were all open to families with all categories of handicapped infants and young children. The programs in the various health units involved home visits by Infant Development Workers (IDWs) who worked with the infant and trained the mother in the use of behavioural strategies to teach cognitive, language, self-help, motor, and social skills to her child (see Appendix D for sample program activities in the cognitive and

communication areas areas).

None of the programs aimed specifically at the modification of mother-child interactions. This fact notwithstanding, it was expected that the acquisition and frequent use of behavioural teaching strategies by mothers in intervention would influence their day-to-day interactions with their children. If this were so, different patterns of interaction would be found between intervention and nonintervention mothers or dyads.

D. Research design

The design employed in this study combined elements of pre-experimental and ex post facto techniques. Two independent variables were under investigation: infant developmental status and early intervention. To examine the effect of infant developmental status (handicapped versus nonhandicapped; developmentally younger versus developmentally older) an ex post facto design was used to compare the interactions of mentally handicapped and nonhandicapped infant-mother dyads.

By including MH infant-mother dyads receiving early intervention, the design made it possible to explore not only the effect of mental handicap on dyadic interactions but also ways in which early intervention may be affecting the interactions of mothers and their MH infants. The presence of two groups of intervention dyads (short versus long) was expected to potentially provide evidence regarding the effect of duration as an important variable in intervention.

The pre-experimental element in the design was reflected in the short-term longitudinal monitoring of the three groups of MH infant-mother dyads. These three groups were assessed a second time 6 to 7 months after the first assessments. By the second assessment, the short and long intervention groups had been in intervention for an average of 8.1 and 13.9 months respectively while the nonintervention group continued to remain on the waiting list because approval for their health unit to begin a program had not as yet been given by Alberta Social Services and Community Health.

Figure 1. Research Design

Group	n	Independent Variable	Post-Test1	Independent Variable	Post Test2
MH—Nonintervention	9		Y_1		Y_2
MH—Short intervention	9	X	Y_1	X	Y_2
MH—Long intervention	9	X	Y_1	X	Y_2
Nonhandicapped MA	9		Y_1		
Nonhandicapped CA	9		Y_1		

The design is schematically presented in Figure 1. Group membership in this study was not by randon assignment. There was an overriding interest in ensuring comparability of the three groups of MH/DD infants on both CA and MA. Since the subject pool from which they were selected was very small, it was not possible to achieve both random assignment and comparability.

E. Data collection

The dependent variable of immediate interest in this study was mother-infant interaction during free play. However, normative data on the mental, motor, and language functioning of the MH infants were also collected to explore the relationships among these variables and the interaction variables. A parent-child behavioural observation instrument (Appendix 1) developed along the lines of Clarke-Stewart's (1973) categories was used to measure dyadic interaction. The Bayley Scales of Infant Development were used to assess mental and motor development while infants' expressive and receptive language skills were assessed using the Reynell Language Scales (Reynell, 1969).

Observation and recording of parent-child interaction

Each mother and her infant were observed in their home during a 30-minute free play session. Before the session began, the observer instructed the mother to engage her child in free

play around any materials and activities in as normal a way as she would during their day-to-day uninterrupted interactions. To minimize the effect of observer presence on the mothers, they were told that the focus and interest of the study were on the child. A second precaution was taken to minimize the effect of observer presence on both the mother and the child; all assessments were preceded by a familiarization visit. Observations of play interactions always followed an assessment of the home environment through a parental interview as well as an assessment of the child on the two normative tests—the Bayley Scales of Infant Development and the Reynell Language Scales. In the case of the CA-match group none of the normative tests was administered; however, those families, like all others, received a familiarization visit. In addition, the observer spent more time with the dyad prior to the actual observations.

The Parent-Child Behavioural Observation (PCBO) instrument used in this study was developed in collaboration with Kysela and was used in the evaluation of Provincial Early Intervention Programs (see Kysela, 1982). It consists of 11 child and 14 maternal behaviours. Each behaviour was assigned a numerical code; child behaviours ranged from code 01 to 11 while maternal behaviours ranged from code 21 to 34. The complete manual on the PCBO instrument with definitions and examples of all codes, as well as instructions for entering data into an electronic data collection device, is presented in Appendix 1.

Apparatus: An electronic data collection device (DATA MORE) designed by Observational Systems Incorporated of Seattle, Washington was used to record maternal and child behaviours *in situ*. DATA MORE permits data recording in 4 different modes. In this study, data were recorded in the Elapsed Clock (EC) mode in 15 two-minute trials. Each trial produced a 120-second continuous time record of numerical behaviour codes with two additional columns respectively showing the length of time elapsing between contiguous codes, and the cumulative time in seconds (see Appendix B).

Data entered on to the MORE can be stored on and retrieved from an ordinary cassette tape through an input-output port connecting the MORE to a tape recorder. By interfacing the MORE with a Decwriter II terminal, data stored on cassette tapes can be transferred for

storage on a computer disc. A 6-volt rechargeable battery pack made it possible to use the equipment over several days without direct electrical power connection.

F. Observer training and reliability

Two female observers with Rehabilitation Practitioners' educational background were trained over a 2- to 3-month period to use the PCBO instrument and the DATA MORE. They learned each interaction variable by its categorical name and numerical code. They also learned to enter their observations on to the DATA MORE, transfer the data on to a cassette tape for storage, and verify the accuracy of transfer. During the first phase of reliability training, the two trainees and the author observed selected videotaped sessions of mother-child interactions. In the second training phase, several visits were made to the homes of volunteer families for live observations.

Three coefficients of interobserver reliability were derived to guide observer training. Through two separate programs in DATA MORE's software package, the Pearson product-moment correlation coefficient (r) and the kappa (k) correlational statistic were obtained by running two sets of data concurrently recorded over an observation session by two observers using two different MOREs. The third procedure involved a hand calculation of reliability defined as the number of agreements divided by the sum of agreements and disagreements.

Because the Pearson r is based on total frequency of each behaviour in a session and not on point-by-point agreement, it yields the largest but least reliable estimate of the three techniques. It was most useful at the beginning of training when it was deemed sufficient to obtain a rough gauge of the extent to which observers agreed on the volume of each behaviour within a session. The third procedure (number of agreements divided by the sum of agreements and disagreements) proved very useful for purposes of providing feedback to trainees regarding specific problem behaviours and for purposes of refining the definitions of such behaviour categories. It not only provided a numerical estimate of reliability but also indicated which behaviours observers disagreed upon most often. Finally, kappa, the most stringent of the three

Table 2. Mean Interobserver Reliabilities

Method	End of Training	Mid Study	End of Retraining
Pearson *r*	.89	.85	.86
Ag/(Ag+Dis)	.78	—	—
Kappa (*k*)	.70	.68	.65

procedures, provided an index of interobserver reliability that was corrected for chance (*k* is based on a point-by-point comparison of two observers' records on both occurrences and nonoccurrences).

The mean reliability data reported in Table 2 are respectively based on live observations of: (a) 4 volunteer mother-child dyads just before data collection formally began; (b) 3 dyads in the study during special reliability checks carried out during the data collection process; and (c) 2 volunteer dyads seen by one of the original observers and the author (for purposes of retraining) just prior to the commencement of data collection on the nonhandicapped sample (data collection on this sample began some 4 to 5 months after termination of data collection on the three MH groups).

G. Data analysis

Analysis of the interaction data was performed at two main levels: (a) a quantitative analysis involving frequency of occurrence of each behavioural variable and (b) a qualitative analysis involving the examination of sequential dependency patterns.

Graphical display of the basic frequency data

Prior to the application of inferential statistics to the data, a graphical data exploration procedure was employed to gain insight into such aspects of the data as level, spread, and extreme scores. Graphs produced from the frequency data were very useful in terms of generating

initial working hypotheses regarding which interactive behaviours were likely to differentiate one category of infants, mothers, or dyads from another.

Utilizing the medians, the first and third quartiles, as well as the low and high scores of the 5 batches (representing the 5 groups), *box-and-whisker* graphs (see Erickson & Nosanchuk, 1977; Maguire, 1984; Velleman & Hoaglin, 1981) were generated for each maternal and child variable. In the next chapter box-and-whisker graphs on assessment 1 data for 10 child and 14 maternal molecular behaviours are displayed in Figures 2 to 10. Each frame has 5 batches representing the 5 groups in the study. Batches 1 to 3 in each frame have twin plots; the shaded plots represent assessment 2 distributions. Traditionally, two batches whose central boxes do not overlap are said to be 'significantly' different from each other. However, Velleman and Hoaglin (1981) have suggested that "the hinges, which determine the extent of the box, are inappropriate guides to significance" (p. 73). One procedure for comparing batches proposed by McGill, Tukey, and Larsen (1978) utilizes special intervals around the median for purposes of comparing batches. These special intervals are derived as:

$$\text{Median} \pm 1.58 \times (\text{H-Spread}) / \sqrt{n}$$

where *H-Spread* is the interquartile range and *n* is the batch size. In the graphs displayed in the results chapter, the special intervals are marked by two notches (<>). Where the special intervals around the medians of two batches fail to overlap, those two batches, according to McGill et al. (1977) can be said to be significantly different at the .05 level. In comparisons involving more than two batches, this procedure is limited, especially when one is interested in comparing combined sets of batches as in post-hoc multiple comparisons.

Nevertheless, in this study the procedure complemented the inferential statistical analyses. As will be seen in the results chapter, most of the group differences depicted by the exploratory graphical displays were confirmed by the inferential statistics. The strength of the exploratory data analysis, then, lay not only in its power to make important elements and patterns in data visible but also in the confidence it provides the researcher when results from this procedure and those from inferential analyses validate each other.

The quality of interaction: Sequential analysis

From the point of view of current emphasis on dyadic interaction as a bidirectional, transactional process (Lewis & Lee-Painter, 1974), analytic methods which treat dyadic behaviours as separate, independent mother and child variables do not provide an adequate picture of the dyadic interaction process. In this study, a procedure for analyzing sequential dependencies (Bakeman, 1979) was utilized to examine the more qualitative aspects of the dyadic interaction process.

Prior to the analysis, a data reduction process was carried out. Children's negative gestures, negative vocalizations, and aggressive-destructive behaviours were collapsed to create one child variable—negative behaviour. Similarly, the two maternal negative behaviours were combined to form one category. In addition, maternal labelling and expansions were combined into one category. As a result of categorizing the data in this fashion, a total of 20 child and maternal behaviours were entered into the analysis.

Using Bakeman's procedure, it was possible to treat each of the 20 infant and maternal behaviours as criterion (antecedent) and to examine the probability that each of the other 19 behaviours will follow the criterion immediately (lag 1), after an intervening event (lag 2), and after two intervening events (lag 3). For example, given criterion behaviour A and a consequent behaviour B, the procedure involves the computation of a binomial *z-score* for comparing the observed transitional probability for B following A with the expected or predicted transitional probability at any given lag size.

In a strict hypothesis testing sense, a *z-score* of ± 1.96 indicates that the difference between the observed and expected transitional probabilities is significant at the .05 level. A positive *z-score* shows a consequent behaviour occurred more than expected by chance while a negative *z-score* indicates a less than chance occurrence (Sackett, 1979). For a number of reasons, Bakeman (1978) has used the *z-score* as a relative index of dependency instead of taking it in its strict hypothesis testing sense. Two of the reasons have to do with underlying assumptions which are not always met. First, the assumption of mutual exclusivity among

behaviour codes is hardly met in observational studies which sample relatively large numbers of dyadic interaction variables. Second, one principal assumption of the sequential analysis technique is that of non-autodependence. That is, an actor's behaviour at any time does not depend on a previous behaviour of the same kind. It is this assumption which makes it possible to treat pairs of observations in sequential analysis as though they were independent of all other pairs. As Alison and Liker (1982) point out, this assumption, while it simplifies the construction of statistical tests, is not very realistic.

The decision to use the *z-score* as a relative index for comparative purposes was based on the view that although the two assumptions cited above are difficult to meet in observational studies of this nature, the sequential analysis procedure provides a tool for looking at the more dynamic aspects of dyadic interaction. In the results reported here a *z-index* of 2.0 was used (cf. Bakeman, 1978) as the cut-off point for determining whether a given antecedent-consequent relationship constituted a characteristic interaction pattern for a dyad or group of dyads. The results are based on behaviour pairs for which the mean *z-index* reached the cut-off level of 2.0 for at least one of the five groups of dyads. The results also represent lag 1 data only because inspection of lag 2 and lag 3 data revealed no significant patterns.

Inferential statistical analyses

To explore the nature of differences and similarities between the interactions of mentally handicapped and nonhandicapped child-mother dyads, a series of one-way multivariate analyses of variance was performed on the frequency and sequential data. The exact MANOVA technique employed was *Rao's Approximate F-test* using Wilk's Lambda. This procedure adjusts the degrees of freedom in analyses involving multiple variables which are not independent. In addition to a multivariate F value, the procedure provides univariate F values for the examination of individual variables in the analysis.

Table 3.1. Illustrative Matrix Showing Expected Pattern of Group Differences Under Hypothesis 1[1]

Group	Non	Short	Long	MA-Comp	CA-Comp
Non	—	NS	NS	NS	**
Short		—	NS	NS	**
Long			—	NS	**
Short + Long	NS			NS	**
Non + Short + Long				NS	**

[1]**Hypothesis 1:** That differences between mothers of mentally handicapped and nonhandicapped children are related to mental age differences between the two categories of children.

Table 3.2. Illustrative Matrix Showing Expected Pattern of Group Differences Under Hypothesis 2[2]

Group	Non	Short	Long	MA-Comp	CA-Comp
Non	—	NS	NS	**	**
Short		—	NS	**	**
Long			—	**	**
Short + Long	NS			**	**
Non + Short + Long				**	**

[2]**Hypothesis 2:** That mothers of mentally handicapped and nonhandicapped children will differ regardless of their children's mental or chronological age comparability.

** **Significant group difference at the .05, .01, or .001 level**

The matrix of significant F-values for group comparisons

A primary concern in this study was to investigate the relative role of children's mental age and diagnostic status in accounting for differences between mothers of mentally handicapped and nonhandicapped children in terms of behavioural interactions. The ***matrix of significant F-values for group comparisons*** was devised in this study to portray patterns of group differences. A matrix was constructed for each interaction variable on which a significant univariate F was obtained following a significant multivariate test.

In the illustration of expected patterns of group differences in Table 3, it is assumed hypothetically, just for the ease of explanation, that early intervention makes no difference among the 3 groups of mother-handicapped child dyads. Where this assumption fails, less clear-cut differences than those shown in Table 3 can be expected. Table 3.1 illustrates the expected pattern of group differences under the hypothesis that differences between mothers of mentally handicapped and nonhandicapped children are related to differences between their handicapped and nonhandicapped children in terms of mental age or level of developmental competence. Table 3.2 on the other hand illustrates the expected pattern of group differences under the hypothesis that mothers of mentally handicapped children will differ from mothers of nonhandicapped children regardless of mental or chronological age comparability between their children.

IV. RESULTS

As described in the last chapter, 45 child-mother dyads were involved in the study. Twenty-seven of these dyads were mentally handicapped children and their mothers falling into 3 groups of 9 each: *nonintervention, short intervention,* and *long intervention.* The mean CAs for the three groups of mentally handicapped children were, respectively, 15.78, 15.74, and 16.10 months. Their mean mental ages were 9.82, 9.92, and 11.66 months respectively. The remaining 18 dyads served as two nonhandicapped control groups of 9 dyads each—a mental age-comparison and a chronological age-comparison. The mental age-comparison group of nonhandicapped children had a mean CA of 11.04 months and a mean mental age of 11.72 months while the mean of the CA-comparison group of nonhandicapped children was 17.34 months.

The study involved two major assessments 6 to 7 months apart for the 27 mentally handicapped children and their mothers, and one assessment for the 18 nonhandicapped children and their mothers. Measures of mother-child free play interactions were taken on all 45 dyads at assessment 1. Two additional instruments were administered on the 27 mentally handicapped children at assessment 1. These instruments were the Bayley Scales of Infant Development (Bayley, 1969) and the Reynell Language Scales (Reynell, 1969). All four major measures were repeated for the 27 MH-mother child dyads approximately 6 months after the first assessment.

Because the design involved repeated measures (2 assessments) for the 3 MH groups and only one data point for the 2 nonhandicapped groups, the main analyses were performed on assessment 1 data for all 5 groups of dyads. In addition to the main analyses, however, comparisons involving assessment 2 data for the 3 MH groups and assessment 1 data for the nonhandicapped groups offered an opportunity to examine the replicability of findings from the main analyses. This second set of comparisons will be referred to subsequently as *cross-time* comparisons or analyses.

A series of one-way multivariate analyses of variance, employing Rao's Approximate F-test, was performed on both the frequency and sequential data in order to explore the nature of differences and similarities between the interactions of mentally handicapped and nonhandicapped child-mother dyads. In addition, *box-and-whisker* graphs were generated for each of the frequency variables to enable a visual inspection of such important aspects of the data as level, spread, and extreme scores. The "special interval around the mean" criterion proposed by McGill et al. (1978), was applied to examine the graphical displays for possible group differences in instances of apparent nonoverlap between central boxes of respective batches.

Finally, relationships between a set of child developmental variables—CA, mental, motor, and language age equivalents) and each child and maternal interaction variable were examined through correlational analyses involving the three MH groups. The correlational analyses were limited to the 3 MH groups because there were no Bayley motor and Reynell language assessments on the nonhandicapped comparison children. The correlation coefficients reported in this chapter are based on a combined sample size of 27. The rationale for pooling the three MH groups was to get a better picture of the relations in the MH sample as as a whole. To eliminate the effect of any between-group differences on the correlations, the frequency data within each of the three groups were transformed into *z-scores* before correlations were calculated over all 27 dyads.

A. Format for presentation of results

The results of the study are presented in two main sections: (1) frequency analyses and (2) sequential dependency analyses. In each section a main as well as a cross-time comparison is made between MH and nonhandicapped groups on each of the interaction variables.

A cross-time comparison of the mean chronological and mental ages of the three groups of mentally handicapped children at assessment 2 (6 to 7 months after assessment 1) with the mean CA and MA of the two nonhandicapped groups of children at assessment 1

revealed that chronologically the MH children were significantly older than but mentally similar to children in each of the two nonhandicapped groups (Table 4). That the MH children remained similar, mentally, to the MA-comparison children after 6 to 7 months of additional growth and development reflects the slower rate of mental development which characterizes mentally handicapped children. The cross-time comparison provided an opportunity to examine stability and change in group differences and to replicate some of the results obtained in the main analyses. By assessment 2 for the MH groups, the relationships between the mental and chronological ages of MH children and those of the nonhandicapped children were such that the two nonhandicapped groups had both become mental age comparisons. Consequently, for purposes of clarity, in presenting results from the cross-time comparisons the referents *younger* and *older* MA comparison will be used for the original MA- and CA-comparison groups respectively.

Table 4. Comparison of MH Children's CA and MA at Assessment 2 With Nonhandicapped Children's CA and MA at Assessment 1

	Non Int_2	Short Int_2	Long Int_2	MA $Comp_1$	CA $Comp_1$	Univ.F
Chronological Age	22.53	22.13	22.21	11.04	17.34	6.73***
Mental Age	15.80	13.01	14.48	11.72	17.34	2.05

Multivariate $F_{(8)(78)} = 4.07$; $p < .001$—All ages are reported in months.

If it is children's mental age and not handicapping condition per se which makes the difference between mothers of MH and nonhandicapped children, then the cross-time comparisons should depict similar patterns of interaction for both categories of mothers. Also if the above premise were true, then in instances where the main analyses showed that mothers of MH children differed only from mothers of CA-comparison children and not from mothers of MA-comparison children, the cross-time comparison should show a wash-out of such

differences. Under the same assumption, in instances where differences emerged in the main analyses between mothers of MH and nonhandicapped children regardless of MA or CA comparability between handicapped and nonhandicapped children, such differences should be replicated in the cross-time comparisons.

B. Frequency analyses

A general picture

To examine major themes in the interactions of mothers and their children, conceptually related behaviours were combined to create the following four broad variables for both child and mother: (1) proximal; (2) nonverbal distal; (3) positive verbal and responsive; and (4) negative. A fifth variable—instructional behaviour—was derived for mothers. Table 5 displays the conceptually related molar variables, their molecular components, and their frequency of occurrence expressed as a percentage of total interaction. For mothers as well as their children positive verbal and responsive behaviours were the most frequently occurring followed by nonverbal distal behaviours.

The box and whisker graphs in subsequent sections are presented under the above broad categories. Generally, the data portrayed a good number of extreme scores (scores which deviated so much from the rest of the scores in a distribution that they could be considered, literally, not to belong to the distribution). A score was considered extreme if its position in the distribution was 1.5 *H-spreads* above the third quartile or below the first quartile, where H-spread is the interquartile range (Q_3-Q_1). Graphically, the central box of the plot represents H-spread. Although the bulk of the extreme scores lacked any consistent pattern, the short intervention group had a disproportionately higher number of extreme scores than any other group. For example, 37% of all extreme scores on child behaviours occurred in that group, and one child alone was responsible for 3 of the extreme scores. This child produced the largest number of positive expressive gestures, smiles, and imitations of maternal behaviour. Equally

Table 5. Frequency of Occurrence (%) of Conceptually Related Molar Variables. (Based on Assessment 1 Data)

Variable	Constituent Behaviours	% Occurrence
Child		
Proximal	Physical contact	1.0
Nonverbal distal	Pos. expr. gesture; Smile; Look	14.4
Positive verbal and responsive	Imitate; Pos. vocalization Comply to verbal instruction	15.0
Negative	Neg. expr. gesture; Negative vocaliz. Aggressive-destructive	1.4
Mother		
Proximal	Physical contact	4.2
Nonverbal distal	Pos. expressive gesture; Smile; Look; Stimulate play	17.5
Positive verbal and responsive	Imitate; Verbal reinforcement; Verbal stimulation	34.8
Negative	Negative expressive gesture; Negative verbalization	0.6
Instructional	Label; Expand Instruct; Physical guidance	11.1

of interest was the finding that 33% of all extreme scores on maternal behaviour occurred in the short intervention group. Three mothers (none of whom was related to the child referred to above) accounted for 6 of the 9 extreme scores within this group. Mother #621 was extremely high on looking and imitation, mother #642 on looking and labelling, and mother #651 on verbal reinforcement and instruction.

Using the "special interval around the median" criterion proposed by McGill et al. (1978), the graphical displays were examined for possible group differences. As can be seen from figures 2 to 10, group differences were most apparent on 2 child and 5 maternal behaviours.

Children

Tables 6.1 and 6.2 present the mean percentage frequencies of each child interaction variable by group for the main and cross-time analyses respectively. Box and whisker graphs for behaviours in each of the four conceptual categories are also displayed in Figures 2 to 5.

As will be seen from Table 6.1, mentally handicapped children generally tended to exhibit fewer positive expressive gestures and to look at their mothers more often than did nonhandicapped children. Also nonintervention and short intervention MH children appeared to make fewer positive vocalizations than long intervention MH children and nonhandicapped children. However, significant group differences were found on only 2 of the 10 child behaviours—positive expressive gestures ($F=9.00$; $p<.001$) and aggressive-destructive behaviour ($F=3.10$; $p<.05$). The difference in aggressive-destructive behaviour was mainly between the nonintervention MH group and each of the other groups. It is significant to point out, however, that this difference is not important in view of the very low occurrence of that behaviour overall (less than 0.5% of all behaviours observed). The only major group differences observed then were with regard to positive expressive gestures.

Table 6.1. Mean Percent Occurrence of Children's Behaviours by Group (Main Comparisons)

Variable	No Int	Short Int	Long Int	MA Comp	CA Comp	Univ. F
Physical contact	1.11	1.27	1.26	0.91	0.30	1.26
Pos. Expr. Gesture	3.03	3.20	3.13	5.76	7.59	9.00***
Smile	3.84	2.56	2.54	3.81	2.92	0.91
Look	8.14	7.87	6.80	5.50	5.21	2.32
Imitate	0.57	0.60	0.51	0.27	1.02	1.04
Pos. Vocalization	10.33	9.02	14.10	13.57	16.53	2.21
Comply[1]	0.27	0.29	0.29	0.14	0.38	1.69
Neg. Expr. Gesture	0.62	0.38	0.44	0.33	0.31	0.72
Neg. Vocalisation	0.50	1.74	1.09	0.97	0.31	1.89
Aggressive-destr.	0.17	0.02	0.04	0.02	0.00	3.10*

Multivariate $F_{(40)(119)}=1.89$; $p<.001$ [* $p<.05$ ** $p<.01$ *** $p<.001$]
[1]Expressed as proportion of child compliance to maternal instructions

Table 6.2. Mean Percent Occurrence of Children's Behaviours By Group (Cross-Time Comparisons)

Variable	Non Int_2	Short Int_2	Long Int_2	Younger MA	Older MA	Univ.F
Physical contact	1.24	0.82	1.33	0.91	0.30	1.43
Pos. expr. gestures	4.93	5.37	4.43	5.76	7.59	2.18
Smile	3.71	2.69	3.13	3.81	2.92	0.56
Look	7.28	6.84	6.93	5.50	5.21	1.34
Imitate	0.58	0.49	0.42	0.27	1.02	1.22
Pos. vocalization	13.75	12.13	11.02	13.57	16.53	1.07
Comply[1]	0.18	0.29	0.22	0.14	0.38	6.03
Neg. expr. gestures	0.49	0.31	0.52	0.33	0.31	0.47
Neg. vocalization	1.66	0.63	0.70	0.97	0.31	2.83
Aggres. destructive	0.04	0.33	0.08	0.02	0.00	1.72

Multivariate $F_{(40)(119)}=1.45$; $p=.065$
[1]Expressed as proportion of child compliance to maternal instruction

Table 6.3. Matrix Of Significant F-values For Group Comparisons: Children' Positive Expressive Gestures (Main Comparisons)

	Non	Short	Long	MA-Comp.	CA-Comp.
Non	—	NS	NS	7.93**	22.22***
Short		—	NS	6.99*	20.62***
Long			—	7.36**	21.26***
MA-Comp				—	NS
Short + Long	NS			9.57**	27.92***
Non + Short + Long				11.14**	32.04***

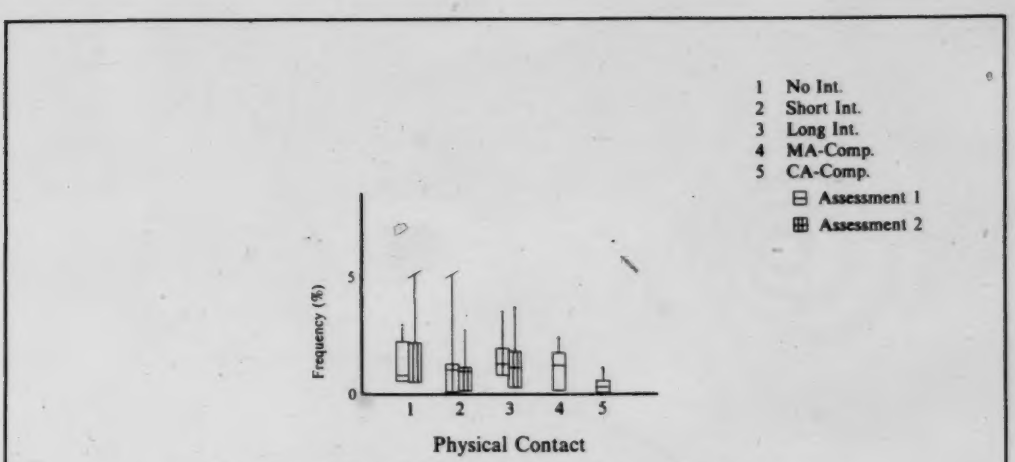

Figure 2. Comparison of Groups on Children's Proximal Behaviours

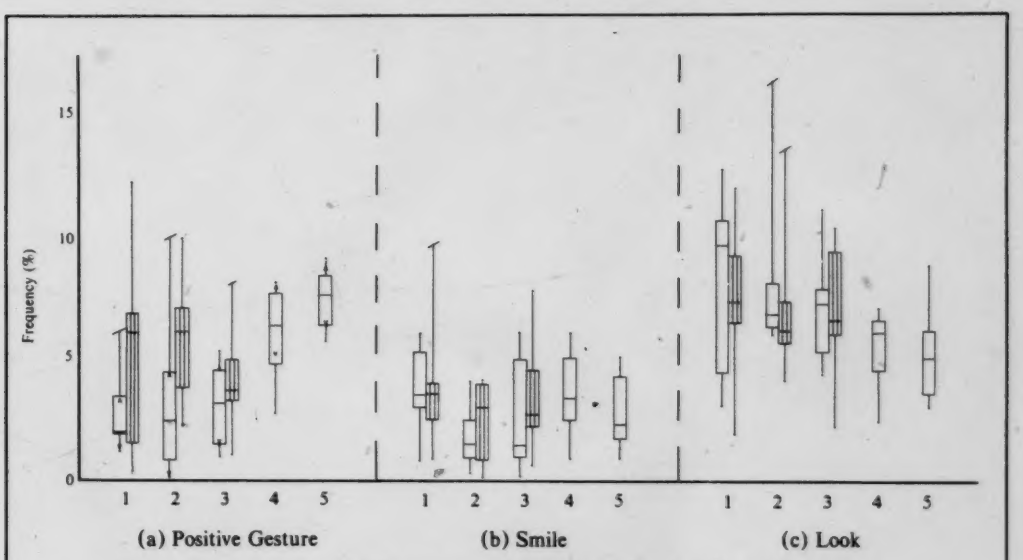

Figure 3. Comparison of Groups on Children's Nonverbal Distal Behaviours

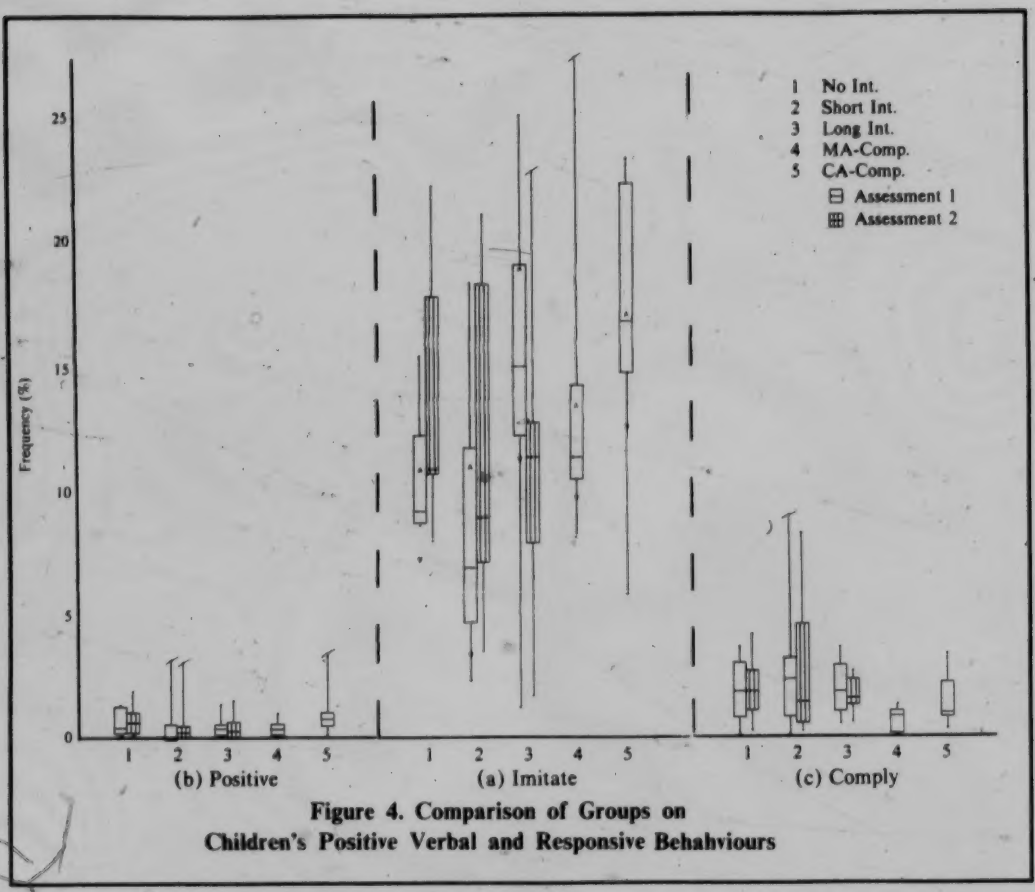

Figure 4. Comparison of Groups on Children's Positive Verbal and Responsive Behahviours

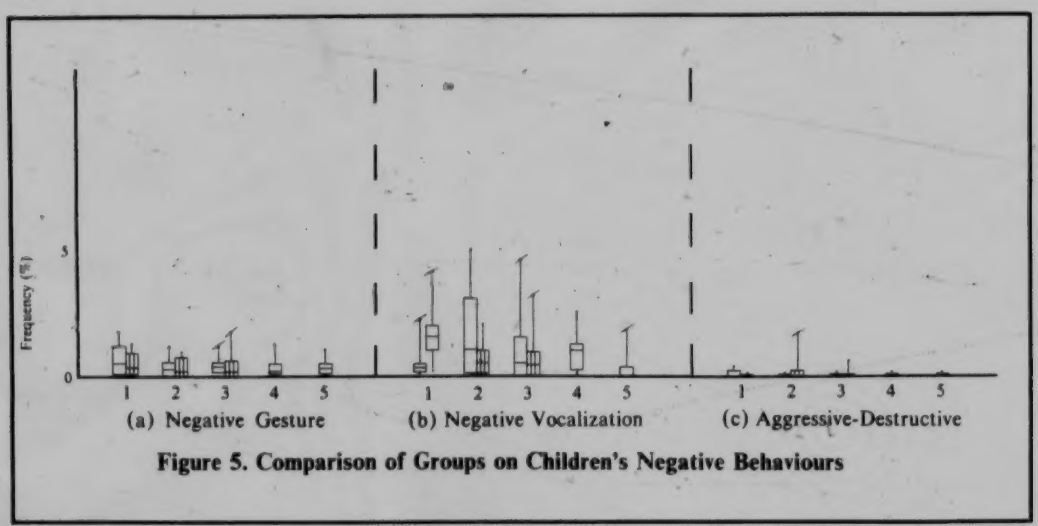

Figure 5. Comparison of Groups on Children's Negative Behaviours

Table 7.1. Correlations Between Mentally Handicapped Children's Behaviours And Their Developmental Characteristics At Assessment 1 (n=27)

	Developmental Characteristics					
Child Behaviour	Intervention (Duration)	C.A.	Bayley Mental	Bayley Motor	Reynell Compr.	Reynell Expr.
Physical contact						
Pos. expr. gesture						.32*
Smile						
Look						
Imitate		.38*		.48**		.43*
Pos. vocalization			.42*		.37*	
Comply					.33*	
Neg. expr. gesture		.54**		.47**		.35*
Neg. vocalization			.39*		.57**	
Aggressive-destruc.		.34*				

*p<.05; **p<.01; ***p<.001. [Underlined figures represent negative correlations]
Only significant correlations are reported

Table 7.2. Correlations Between Mentally Handicapped Children's Behaviours And Their Developmental Characteristics At Assessment 2 (n=27)

	Developmental Characteristics					
Child Behaviour	Intervention (Duration)	C.A.	Bayley Mental	Bayley Motor	Reynell Compr.	Reynell Expr.
Physical contact				.39*		
Pos. expr. gesture						
Neg. expr. gesture						
Smile						
Look						
Imitate			.38*			.37*
Pos. vocalization			.43*	.40*	.41*	.50**
Neg. vocalization						
Aggressive-destruc.						
Comply						

*p<.05; **p<.01; ***p<.001. [Underlined figures represent negative correlations]
Only significant correlations are reported

Positive expressive gestures: Pairwise comparisons on this behaviour showed that both the nonhandicapped MA- and CA-comparison children exhibited significantly more positive expressive gestures (use of gestures to express need or intent, to respond to mother, to attain and/or direct mother's attention) than children in each of the three MH groups. Since no differences existed among the 3 MH groups, multiple comparisons involving their combined mean and the means of each of the two nonhandicapped groups were also examined. Table 6.3 presents a matrix of significant F-values for both pairwise and multiple group comparisons. As a group, mentally handicapped children made significantly fewer positive expressive gestures than their nonhandicapped MA-comparison ($F=11.14$; $p<.05$) and CA-comparison ($F=32.04$; $p<.001$). Figure 3a supports this conclusion. By assessment 2, however, the differences between the MH and nonhandicapped groups had disappeared as a result of an average 53% increase in MH children's display of the behaviour (note the rise in level from assessment 1 to assessment 2 and the resulting overlap between box plots for MH and nonhandiapped groups in Figure 2).

The main MANOVA for the cross-time comparisons showed no significant group differences ($F=1.45$; $p<.065$) among the 10 child behaviours, although a sharp decrease in compliance to verbal instructions in the nonintervention MH group appears to have led to a difference large enough to reach statistical significance on a univariate test. Essentially then, mentally handicapped children and their nonhandicapped mental and chronological age comparisons manifested similar frequency patterns.

Mothers

Mean percentage frequencies for each maternal variable are presented in Table 8.1 (main analysis) and Table 8.2 (cross-time) comparisons. In Figures 6 to 10, group distributions on each of the 14 maternal variables are presented in box-and-whisker graphs. The MANOVA results revealed several interesting patterns pointing to both transient and more stable patterns of differences between mothers of mentally handicapped and nonhandicapped

children. In all, group differences emerged on 6 of the 14 maternal behaviours in the main analysis. The variables showing group differences were physical contact, positive expressive gestures, negative expressive gestures, looking, verbal stimulation, and instruction. In the cross-time comparisons differences were maintained on only three of the above six behaviours—looking, instruction, and verbal stimulation—while a new group difference emerged on physical guidance.

Three categories of group differences were discernible from the main and cross-time analyses: (1) group differences related to mental age differences between handicapped and nonhandicapped children; (2) group differences which were unrelated to mental and chronological age differences or similarities between handicapped and nonhandicapped children; and (3) group differences related to participation in early intervention. Negative expressive gesture revealed a unique pattern of group differences which could not be placed under any of the above three categories. As with physical contact and positive expressive gesture the group differences observed on negative expressive gesture were not replicated in the cross-time comparison. However, negative gesture was the only variable on which mothers of the two nonhandicapped child groups differed. Second, mothers of MH children, as a group, made significantly fewer negative gestures than did mothers of MA-comparison nonhandicapped children ($F=6.40$; $p<.05$) while not differing from mothers of CA-comparison children (Table 10a). It would appear from these results that mothers of MH children were characteristically less strict with their children. However, the absence of a significant difference between these mothers and mothers of CA-comparison children would appear to weaken this interpretation. It should be noted also that this behaviour was one of the least frequent categories—less than 1% occurrence—and hence the observed difference may not be a reliable one.

Table 8.1. Mean Percent Occurrence of Maternal Behaviours by Group (Main Comparisons)

	No Int	Short Int	Long Int	MA Comp	CA Comp	Univ. F
Physical contact	4.30	6.52	5.00	3.30	1.83	3.09*
Pos. Expr. Gesture	2.02	2.71	3.26	3.69	5.03	4.13**
Look	10.93	10.41	8.64	5.36	4.37	11.01***
Smile	2.00	2.39	1.71	2.98	2.76	1.27
Stim. of Play	4.72	4.54	4.48	4.10	2.44	2.29
Imitate	1.31	1.53	1.27	0.79	1.50	0.74
Verbal Stim.	30.47	26.26	27.21	38.86	34.61	6.51***
Verbal Reinforce.	1.66	2.74	2.10	1.06	2.70	1.32
Neg. Expr. Gesture	0.46	0.11	0.27	0.61	0.27	2.88*
Neg. Verbalization	0.47	0.17	0.32	0.33	0.00	1.11
Instruct	7.73	9.36	8.18	3.30	4.02	4.45**
Physical Guidance	1.54	1.57	2.11	1.30	0.59	1.38
Expand	0.16	0.24	0.27	0.14	0.76	2.36
Label	2.36	2.28	3.31	2.62	3.44	0.71

Multivariate $F_{(56)(241)}=2.24$; $p<.001$ [* $p<.05$ ** $p<.01$ *** $p<.001$]

Table 8.2. Mean Percent Occurrence of Maternal Behaviours By Group (Cross-Time Comparisons)

Variable	Non Int_2	Short Int_3	Long Int_2	Younger MA	Older MA	Univ.F
Physical contact	4.33	5.72	3.79	3.30	1.83	1.60
Pos. expr. gesture	3.51	4.67	4.96	3.69	5.03	1.77
Look	8.33	8.79	9.19	5.36	4.37	7.68***
Smile	2.09	1.74	1.91	2.98	2.76	0.99
Stimulation of play	4.47	3.62	2.82	4.10	2.44	1.08
Imitate	0.60	0.84	0.71	0.79	1.50	1.74
Verbal stimulation	25.30	24.97	27.73	38.86	34.61	7.46***
Verb. reinforcement	1.33	2.53	1.91	1.06	2.70	1.45
Neg. expr. gesture	0.50	0.27	0.32	0.61	0.27	0.84
Neg. verbalization	0.82	0.00	0.24	0.33	0.00	1.41
Instruct	8.90	8.29	8.63	3.30	4.02	4.45**
Physical guidance	0.58	0.96	2.17	1.30	0.59	3.83*
Expand	0.74	0.80	0.40	0.14	0.76	1.56
Label	3.08	3.48	4.94	2.62	3.14	1.16

Multivariate $F_{(56)(107)}=2.26$; $p<.001$
* $p<.05$; ** $p<.01$; ***$p<.001$

Table 9.1. Correlations Between Maternal Behaviours and Mentally Handicapped Children's Developmental Characteristics At Assessment 1 (n=27)

	Developmental Characteristics					
Child Behaviour	Intervention (Duration)	C.A.	Bayley Mental	Bayley Motor	Reynell Compr.	Reynell Expr.
Physical contact		.55**	.46**	.63***	.33*	.51**
Pos. expr. gesture				.38*		.46**
Look						
Smile						
Stim. of play		.38*				.33*
Imitate						
Verbal stim.		.46*	.39*	.51*	.35*	.40*
Verbal reinforce.						
Neg. expr. gesture		.36*				
Neg. verbalization						
Instruct						
Physical guidance	.50*		.35*	.35*	.36*	.37*
Expand		.48**	.60**	.50**	.41*	.61**
Label						

*p<.05; **p<.01; ***p<.001 [Underlined figures represent negative correlations]
Only significant correlations are reported

Table 9.2. Correlations Between Maternal Behaviours And Handicapped Children's Developmental Characteristics At Assessment 2 (n=27)

	Developmental Characteristics					
Maternal Behaviour	Intervention (Duration)	C.A.	Bayley Mental	Bayley Motor	Reynell Compr.	Reynell Expr.
Physical contact			.46**	.33*		
Pos. expr. gesture						
Look						
Smile						
Stim. of play				.66**		
Imitate						
Verbal stim.					.34*	.41*
Verbal reinforce.			.41*	.45**	.36*	.57**
Neg. expr. gesture				.38*		
Neg. verbalization		.51**		.45*		
Instruct						
Physical guidance			.43**	.44*	.36	.41**
Expand	.52*		.44*			
Label			.37			

*p<.05; **p<.01; ***p<.001 [Underlined figures represent negative correlations]
Only significant correlations are reported

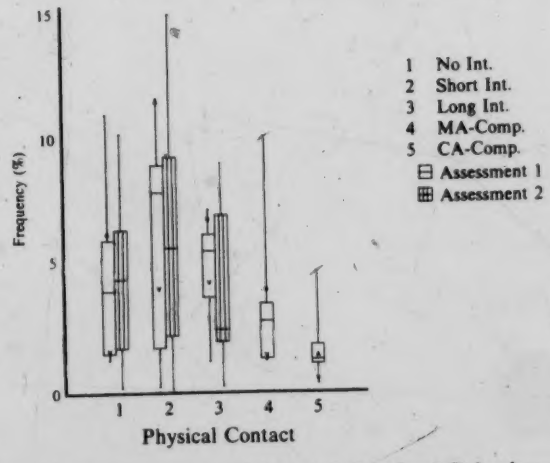

Figure 6. Comparison of Groups on Maternal Proximal Behaviours

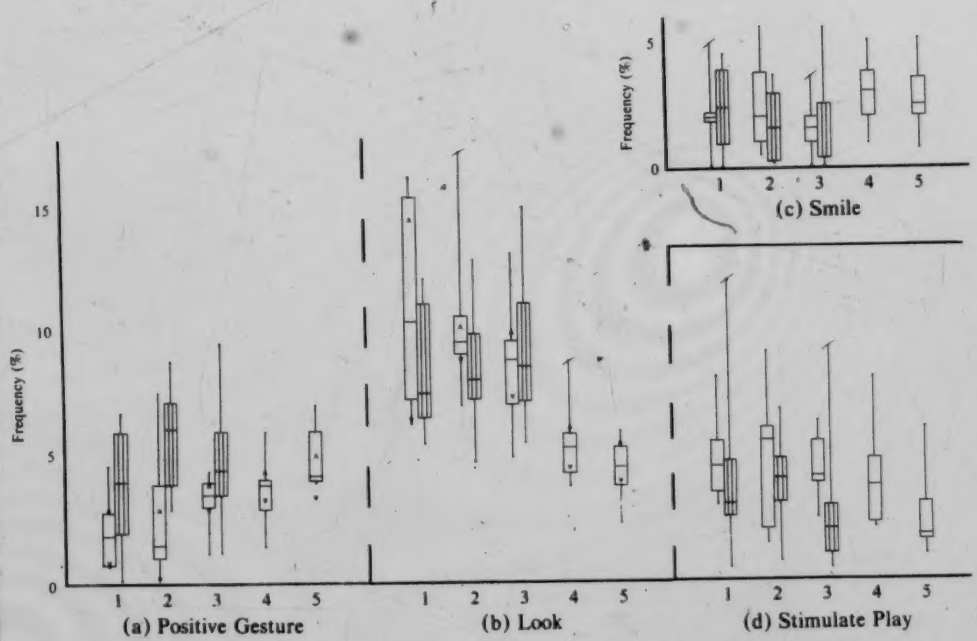

Figure 7. Comparison of Groups on Maternal Nonverbal Distal Behaviours

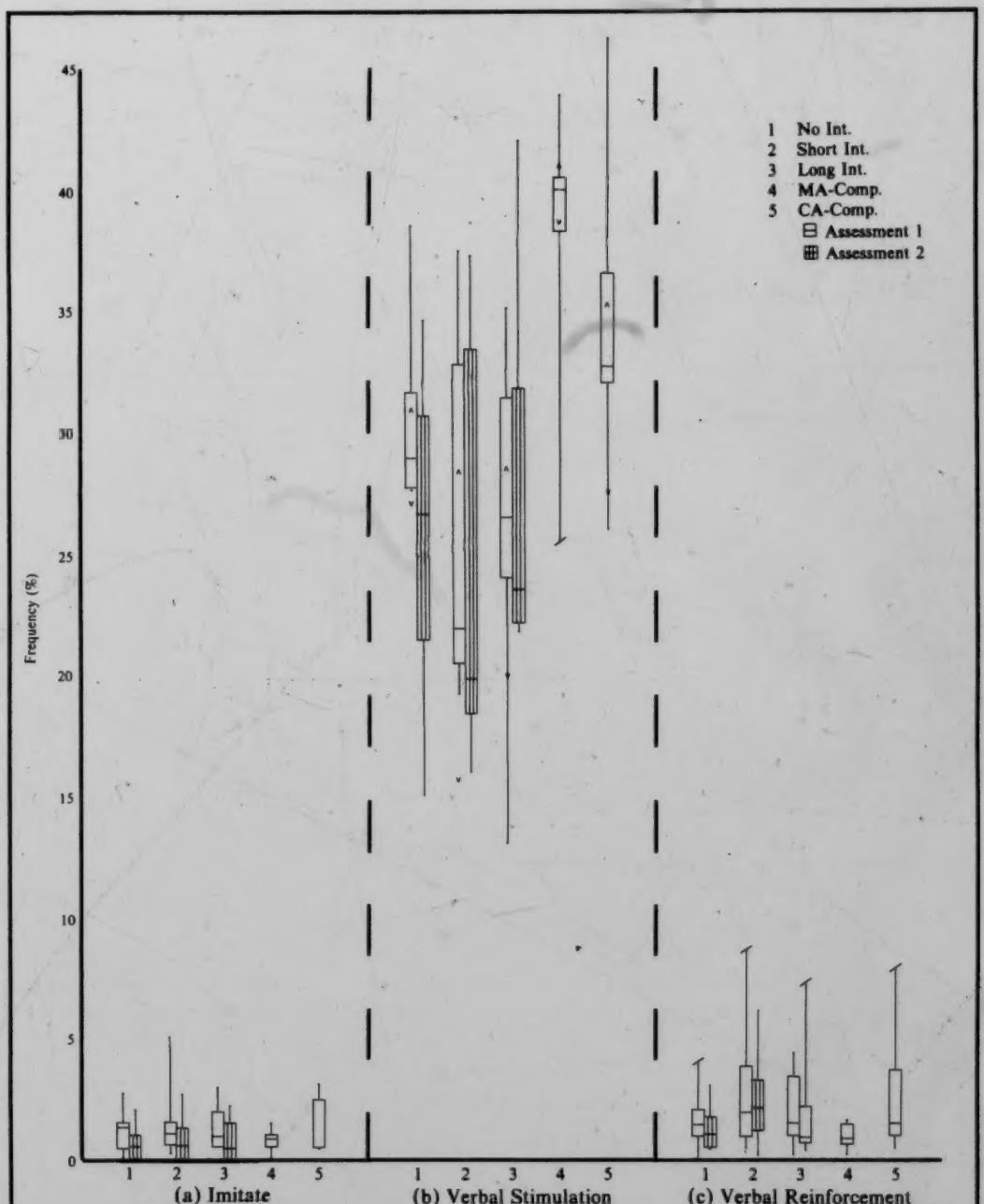

Figure 8. Comparison of Groups on Maternal Positive Verbal and Responsive Behaviours

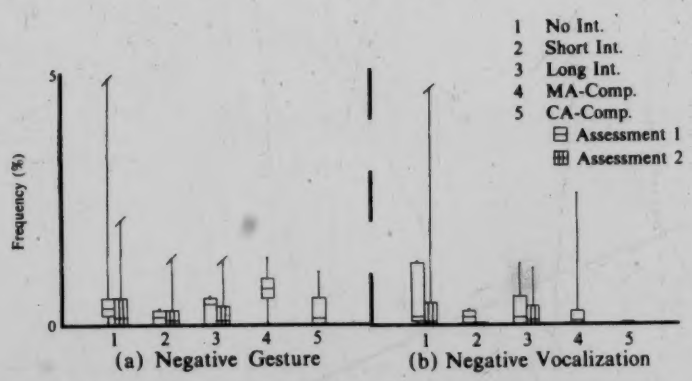

Figure 9. Comparison of Groups on Maternal Negative Behaviours

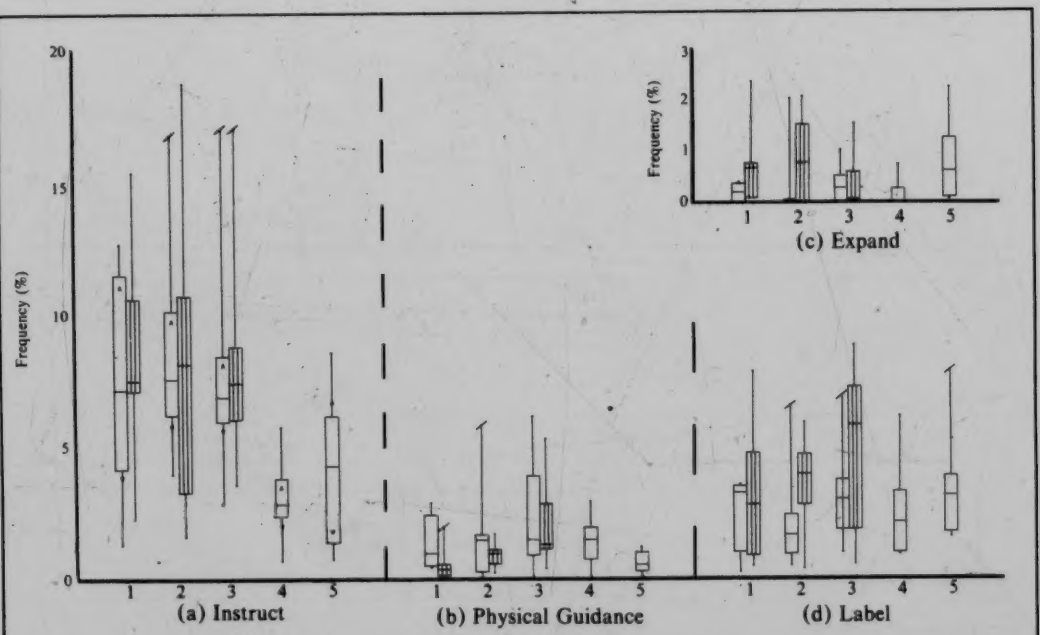

Figure 10. Comparison of Groups on Maternal Instructional Behaviours

Table 10. Matrix Of Significant F-values For Group Comparisons: Maternal Behaviours (Main analysis)

(a) Negative Expressive Gestures

	Non	Short	Long	MA-Comp	CA-Comp
Non	—	4.56*	NS	NS	NS
Short		—	NS	9.62**	NS
Long			—	4.56*	NS
MA-Comp				—	4.56*
Short + Long	NS			9.14**	NS
Non + Short + Long				6.40*	NS

(b) Physical Contact

	Non	Short	Long	MA-Comp.	CA-Comp
Non	—	NS	NS	NS	NS
Short		—	NS	5.15*	10.90**
Long			—	NS	4.97*
MA-Comp				—	NS
Short + Long	NS			NS	10.20**
Non + Short + Long				NS	8.81**

(c) Positive Expressive Gestures

	Non	Short	Long	MA-Comp	CA-Comp
Non	—	NS	NS	4.47*	14.60***
Short		—	NS	NS	8.68**
Long			—	NS	5.09*
MA-Comp				—	NS
Short + Long	NS			NS	9.02**
Non + Short + Long				NS	13.57**

1. Group differences related to children's mental age differences

On two variables—physical contact and positive expressive gesture—differences between mothers of mentally handicapped and nonhandiapped children were clearly related to mental age differences between the two categories of children.

Physical contact: An inspection of Figure 6 and the group means in Table 8.1 shows generally higher levels of physical contact among mothers of MH children compared especially to mothers of nonhandicapped CA-comparison children. The MANOVA results showed no differences among the three MH groups. A comparison of the combined mean for mothers of MH children with the means of mothers of the MA- and CA-comparison children respectively confirmed that mothers of mentally handicapped children made significantly more physical contacts with their children than mothers of CA-comparison children ($F=8.81$; $p<.01$) but did not differ from mothers of nonhandicapped MA-comparison children (Table 10b). This finding indicated that mothers of developmentally younger children, regardless of the child's diagnostic status (handicapped vs nonhandicapped) tended to establish physical contacts with their children more often than did mothers of developmentally older children.

The cross-time comparison provided an opportunity to validate the above finding. By assessment 2 the MH children were chronologically older than but mentally similar to the two nonhandicapped groups of children. On the basis of the above finding and interpretation one would expect no differences between mothers of the two categories of children in their initiation of physical contacts. As Table 8.2 shows this expectation was confirmed in the cross-time comparison, providing further support for the interpretation that the higher frequency of initiating physical contact found among mothers of MH children in the main analysis was related to their children's developmental age and not to their handicapping condition per se.

The correlational data for the three MH groups at both assessment points provided additional support for this finding. In the main analysis significant negative correlations were found between mothers' physical contact and their children's CA ($r=-.55$; $p<.01$), scores on the Bayley mental ($r=-.46$; $p<.01$), Bayley motor ($r=-.63$; $p<.001$), Reynell comprehension

($r=-.33$; $p<.05$), and Reynell expressive ($r=-.51$; $p<.01$) scales (Table 9.1). The correlational data for assessment 2 data (Table 9.2) indicated that mothers continued to make more physical contacts with developmentally younger and less competent children.

Positive expressive gestures: A reverse pattern (from the physical contact results) was found for mothers' positive expressive gestures. That is, as a group mothers of MH children made significantly *fewer* positive gestures than did mothers of CA-comparison children ($F=13.57$; $p<.01$) while not differing from mothers of MA-comparison children (Table 10c). Thus, again, there was an indication that a difference between mothers of mentally handicapped and nonhandicapped children may be related to children's developmental age and not their diagnostic status.

As in the case of physical contact, the disappearance of this difference in the cross-time comparison provided further support for the interpretation. By assessment 2 when the MH children were of comparable mental age as children in both nonhandicapped groups, their mothers had increased their positive expressive gestures by some 65% to a level similar to that of mothers of the 'original' nonhandicapped CA comparison children. Figure 7a illustrates this upward shift in frequency level within the MH groups. The significant positive correlations between this maternal behaviour and children's motor ($r=.37$; $p<.05$) and expressive language ($r=.46$; $p<.01$) age found in the assessment 1 data indicated that mothers directed more positive gestures to children who were motorically and expressively more competent.

2. Group differences unrelated to children's chronological and mental age

On three of the maternal variables, the group differences emerging between mothers of mentally handicapped and nonhandicapped children in the main analysis were replicated in the cross-time comparisons and appeared in both comparisons to defy mental and chronological age similarities and/or differences between the two categories of children. These variables were looking, instruction, and verbal stimulation.

Looking: As Tables 8.1 and 8.2 and Figure 7b show, visual regard of the child was generally higher in the MH groups than in the nonhandicapped groups. In both the main and cross-time comparisons, contrasts involving group means confirmed that as a group mothers of MH children exhibited significantly more visual regard of their children than did mothers of MA-comparison ($F=20.32$; $p<.001$ for the main analysis and $F=13.99$; $p<.001$ for the cross-time analysis) and CA-comparison[2] ($F=29.90$; $p<.001$ for the main analysis and $F=23.27$; $p<.001$ for the cross-time analysis) children (Tables 11a and 11b). Contrary to the interpretation offered on physical contact and positive expressive gesture, higher levels of maternal visual regard of the child appeared to be a characteristic interaction pattern which consistently differentiated mothers of mentally handicapped children from mothers of nonhandicapped children regardless of the child's developmental level of functioning. The absence of any significant correlations between maternal looking and children's CA and scores on normative tests provided further evidence that the differences between the two main categories of mothers may be a function solely of the child's handicapping condition. That is, within the MH groups, differences in level of mental, motor, or linguistic functioning did not seem to affect maternal looking behaviour. Length of participation in intervention was not related to frequency of maternal looking either.

It may be speculated that the higher levels of looking behaviour exhibited by mothers of handicapped children in comparison with mothers of nonhandicapped children may be related to handicapped children's limited mobility giving rise to closer proximity between mother and child in the interactive context. It is also conceivable that due to a relatively less independent activity on the part of the handicapped children their mothers may have engaged in more directed activities with them; such directed activities may concomitantly require mothers to establish eye contact with the child. In fact the data on maternal instructional behaviour appear to support this speculation. Finally, high levels of visual regard may represent one of the strategies that mothers of mentally handicapped children employ in their effort to enter into

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[2]Note that in the cross-time analyses this group was also a MA-comparison.

Table 11. Matrix Of Significant F-values For Group Comparisons: Maternal Behaviours

(a) Looking (Main Comparisons)

	Non	Short	Long	MA-Comp	CA-Comp
Non	—	NS	NS	19.57***	27.12***
Short		—	NS	16.08***	22.98***
Long			—	6.80*	11.51**
MA-Comp				—	NS
Short + Long	NS			14.60***	22.34***
Non + Short + Long				20.32***	29.90***

(b) Look (Cross-Time Comparisons)

	Non	Short	Long	Younger MA	Older MA
Non	—	NS	NS	7.09*	12.59**
Short		—	NS	9.43**	15.65***
Long			—	11.76**	18.60***
Younger MA				—	NS
Short + Long	NS			14.08***	22.79***
Non + Short + Long				13.99***	23.27***

(c) Instruct (Main Comparisons)

	Non	Short	Long	MA-Comp	CA-Comp
Non	—	NS	NS	6.06*	4.25*
Short		—	NS	11.31**	8.78**
Long			—	7.34**	5.33*
MA-Comp				—	NS
Short + Long	NS			12.29**	9.26**
Non + Short + Long				12.14**	8.96**

(d) Instruct (Cross-Time Comparisons)

	Non	Short	Long	Younger MA	Older MA
Non	—	NS	NS	9.37**	7.11*
Short		—	NS	7.44*	5.44*
Long			—	8.50**	6.36*
Younger MA				—	NS
Short + Long	NS			10.62**	7.85**
Non + Short + Long				12.63***	9.43**

Table 11 Continued/

(e) Verbal Stimulation (Main Comparisons)

	Non	Short	Long	MA-Comp	CA-Comp
Non	—	NS	NS	8.28**	NS
Short		—	NS	18.67***	8.21**
Long			—	15.95***	6.44*
MA-Comp				—	NS
Short + Long	NS			23.04***	9.73**
Non + Short + Long				20.87***	7.76**

(f) Verbal Stimulation (Cross-Time Comparisons)

	Non	Short	Long	Younger MA	Older MA
Non	—	NS	NS	18.06***	8.52**
Short		—	NS	18.96***	9.14**
Long			—	12.16**	4.65*
Younger MA				—	NS
Short + Long	NS			20.49***	8.94**
Non + Short + Long				24.36***	10.93**

(g) Physical Guidance (Cross-Time Comparisons Only)

	Non	Short	Long	Younger MA	Older MA
Non	—	NS	11.16**	NS	NS
Short		—	6.49*	NS	NS
Long			—	NS	11.01**
Younger MA				—	NS
Short + Long	5.70*			NS	5.57*
Non + Short + Long				NS	NS

and maintain social discourse with their children.

Instruction: In the main analysis mothers of mentally handicapped children gave significantly more instructions than did mothers of MA-comparison ($F=12.14$; $p<.01$) and CA-comparison ($F=8.96$; $p<.01$) nonhandicapped children respectively (Table 11c). At assessment 2, mothers of MH children gave relatively the same amount of instruction and, consequently, the cross-time comparison showed that mothers of mentally handicapped children continued to exhibit significantly higher levels of instruction than did mothers of the two nonhandicapped groups of children (see Table 11d for F-values). The absence of any significant correlations between maternal instructional behaviour on one hand and intervention and children's developmental characteristics on the other was replicated in the assessment 2 analysis. It could thus be concluded that regardless of within group mental or chronological age differences among children, or of differences in degree of involvement in intervention, mothers of handicapped children characteristically issued more instructions to their children.

The high levels of instructional behaviour observed among mothers of mentally handicapped children in this study are consistent with results reported in several other studies. In fact, the one consistent finding across studies utilizing CA- or MA-comparison designs is that mothers of mentally handicapped children tend to give orders, instructions, or directives to their children more often than do mothers of nonhandicapped children (Breiner & Forehand, 1982; Cunningham et al., 1981; Eheart, 1982; Herman & Shantz, 1983; Kogan et al., 1969; Marshall et al., 1973; Stoneman et al., 1983). Suggestions have been made to the effect that the frustration of receiving minimal levels of response from the mentally handicapped child literally forces mothers to engage in more directive interactions to make up for the child's inadequate responding (Field, 1980, 1983).

In the present study the "minimal levels of response" hypothesis was not supported because only one major significant difference was found between handicapped and nonhandicapped children in terms of their behavioural interactions. It is conceivable, however, that the behavioural coding system used in this study was not sensitive enough to adequately

tap differences between the two categories of children. A more plausible explanation, at least in the context of this study, may be that the high levels of instructional behaviour on the part of mothers of mentally handicapped children may represent an acquired mode of interaction which reflects parental efforts to train or elicit age-appropriate behaviour and/or performance.

Verbal stimulation: This behaviour code encompassed all maternal verbalizations which could not be classified either as contingent behaviours (e.g. verbal reinforcement and imitation) or definite teaching behaviours (e.g. labelling, expansion, or instruction). In both the assessment 1 and cross-time comparisons mothers of mentally handicapped children, as a group, exhibited significantly fewer generalized verbalizations than did mothers of nonhandicapped children (Tables 11e & 11f). The assessment 1 correlational data showed that while this behaviour was not related to length of involvement in intervention, it showed significant negative correlations with children's CA ($r=-.46$; $p<.01$) and Bayley mental ($r=-.39$; $p<.05$), Bayley motor ($r=-.51$; $p<.01$), Reynell comprehension ($r=-.35$; $p<.05$), and Reynell expressive ($r=-.40$; $p<.05$) scores. Although several of the correlations washed out by assessment 2, maternal verbal stimulation continued to show significant negative correlations with children's performance on the Reynell comprehension ($r=-.34$; $p<.05$) and expressive ($r=-.41$; $p<.05$) language scales.

This consistent pattern of directing more verbal stimulation at chronologically younger and developmentally less competent children would appear to suggest that unlike looking and instructional behaviour, maternal verbal stimulation may not necessarily be a function solely of children's diagnostic status. That is, beyond the child's handicap mothers' behaviour was also influenced by the child's level of mental and linguistic functioning.

The higher frequency of instructions and lower levels of generalized verbal stimulation were not necessarily inconsistent. As mothers engaged in more instructions, other verbal behaviours were bound to occur less frequently. In fact, a closer look at the data suggested that mothers of handicapped and nonhandicapped children did not differ in the absolute frequency of all positive vocalizations produced. A summation of the mean frequencies of all positive

verbalizations (verbal reinforcement, verbal stimulation, labelling, expansion, and instruction) for assessment 1 data, for example, confirmed this. The mean frequencies of all positive verbalizations summed up to 42.38, 40.88, and 41.07 per cent for the three MH groups respectively. The corresponding totals for the two nonhandicapped groups were 45.99 and 45.53 respectively. Although these means depicted generally similar frequency levels, the MH groups were slightly on the lower end; yet the analysis showed that instructions were significantly more frequent in the MH groups than they were in the nonhandicapped groups. Thus the significant differences between mothers of handicapped and nonhandicapped children in terms of the frequency of generalized verbal stimulation may have been an artifact due largely to the fact that the absolute number of verbalizations produced by mothers of mentally handicapped children contained a significantly larger number of instructions than did the verbalizations of mothers of nonhandicapped children.

3. Group differences related to early intervention

Physical guidance was one maternal behaviour which was expected to differentiate between intervention and nonintervention mothers of mentally handicapped children. The main analysis showed no significant differences either between intervention and nonintervention mothers or between mothers of MH and nonhandicapped children. Over the 6- to 7-month period, however, the nonintervention group showed a sharp (63%) decrease in their use of physical guidance while mothers in the short intervention group also decreased their use of that behaviour moderately (39%). Consequently, in the cross-time comparisons a significant difference emerged between the nonintervention mothers and intervention mothers.

As Table 11g illustrates, multiple comparisons confirmed that mothers in intervention exhibited significantly more physical guidance behaviours than did nonintervention mothers ($F=5.70$; $p<.05$) and mothers of the older nonhandicapped children ($F=5.57$; $p<.05$). While this finding is difficult to interpret because of the absence of a significant difference between intervention mothers and mothers of the younger nonhandicapped MA-comparison, it suggests

that among mothers of MH children amount of intervention received was associated with a more frequent use of physical guidance behaviours. In fact, the assessment 1 data showed a significant positive correlation ($r = .50$; $p < .05$) between length of intervention and maternal use of physical guidance. The stable level maintained by the long intervention group, relative to the sharp decline shown by the nonintervention group, is particularly noteworthy. This finding was in the expected direction because the intervention procedures to which the intervention dyads in this study were exposed emphasized parents' use of several levels of prompting, including hands-on physical guidance, in direct teaching.

Other behaviours

On several of the remaining behaviours on which mothers of mentally handicapped and nonhandicapped children did not differ, there were interesting correlational patterns within the MH groups. Some of these correlational patterns illustrated maternal regulation of behaviour to match the child's developmental level or behavioural input. For example, mothers tended to direct more negative behaviours at chronologically older and motorically more competent children. Maternal negative expressive gestures (e.g. physical restraint of the child) correlated positively with children's CA ($r = .36$; $p < .05$) at assessment 1 and with psychomotor age ($r = .38$; $p < .05$) at assessment 2 while negative verbalizations (e.g. reprimands and verbal disapproval) correlated positively with children's CA ($r = .47$; $p < .01$) and psychomotor age ($r = .45$; $p < .01$) at assessment 2 (Tables 9.1 & 9.2).

Mothers of mentally handicapped children tended to engage in more labelling and expansion of vocalization with linguistically and mentally more competent children. The frequency of maternal labelling correlated positively with children's Bayley mental scores ($r = .37$; $p < .05$) at assessment 2. At assessment 1 the correlations between maternal expansion of positive vocalization and children's mental, receptive, and expressive language ages were, respectively, .60 ($p < .001$), .41 ($p < .05$), and .61 ($p < .001$). Maternal expansion also correlated significantly with children's CA ($r = .48$; $p < .01$) and psychomotor age ($r = .50$; $p < .01$) respectively. Although most of the correlations washed out by assessment 2, mothers continued to

direct more labelling behaviour at mentally more competent children. These correlations were consistent with the data on children which showed significant positive correlations between children's positive vocalizations and their mental and linguistic competence at both assessment points.

Finally, mothers tended to direct more physical guidance or prompting behaviours at children who were less competent mentally, motorically, and linguistically. At assessment 1 physical guidance correlated -.35 ($p<.05$) with mental age, -.35 ($p<.05$) with motor age, -.36 ($p<.05$) with receptive language age, and -.37 ($p<.05$) with expressive language age. These correlations remained relatively stable at assessment 2. Thus mothers regulated teaching strategies to match the child's level of competence.

Summary

In the analysis of children's behaviours the only major difference between mentally handicapped and nonhandicapped children was with regard to positive expressive gestures. The main analysis showed mentally handicapped children to exhibit significantly fewer positive gestures than their mental as well as chronological age nonhandicapped comparison. However, this difference washed out as the handicapped children attained mental age comparability with both groups of nonhandicapped children. Despite the absence of marked differences between mentally handicapped and nonhandicapped children, mothers of the two categories of children differed in several interactive characteristics.

Three categories of group differences were identified. First, differences between mothers of mentally handicapped and nonhandicapped children with regard to physical contact and positive expressive gestures were shown to be related to mental age differences between handicapped and nonhandicapped children and not necessarily to differences in diagnostic status. Second, with regard to maternal looking and instructional behaviour, the evidence suggested that differences between mothers of mentally handicapped and nonhandicapped children were independent of chronological and mental age characteristics of the two categories

of children. It was suggested therefore that high levels of visual regard and instructional behaviour were unique interactive characteristics exhibited by mothers of mentally handicapped children. Finally, early intervention appeared to be related to increased use of physical guidance in the interactions of mothers with their mentally handicapped children.

A major weakness of studies employing CA-match comparisons only is that they are limited in the extent to which patterns unique to mothers of handicapped children can be distinguished from patterns that may be generally common to mothers of developmentally younger children regardless of diagnostic status. The above findings underscored the strength of the dual comparison-cum-short longitudinal design utilized in the present study. Through this design it was demonstrated that while high levels of visual regard and instructional behaviour were unique to mothers of mentally handicapped children, high levels of physical contact and lower occurrence of positive expressive gestures were patterns which characterized the interactions of mothers of developmentally younger children in general.

C. The quality of interaction: Sequential dependency analysis

Two kinds of statistical analysis are involved in the presentation of results in this section. Where only one or two groups of dyads showed a significant pattern of dependency (as indicated by a z-score of 2.0 or more), group comparisons were based solely on straight *z-scores* obtained from the sequential analysis. However, where 4 or all 5 groups displayed a significant dependency pattern, the *z-scores* were further subjected to an analysis of variance to examine group differences in the *strength* of dependency. Using this criterion, 7 and 8 antecedent-consequent pairs were subjected to multivariate analyses of variance for the main (assessment 1) and cross-time comparisons respectively. In all 10 unique sequential dependency patterns emerged from the analysis. Each of these patterns is described in the following sections.

Tables 12.1 and 12.2 present the mean z-scores for all sequential pairs for the main and cross-time comparison data respectively. The antecedent-consequent pairs subjected to multiple

analyses of variance (7 pairs in the main comparisons and 8 in the cross-time comparisons) are presented in Tables 13.1 and 13.2. Graphical displays of all 13 pairs examined in the main analysis appear in Figures 11 to 14. It is important to note that each graph is scaled differently. In all cases, however, the horizontal line corresponding to $z=2.0$ indicates the level which a sequential relationship must reach to be considered a characteristic pattern of interaction.

Reciprocal positive expressive gestures: In the main analysis, dyads in all five groups exhibited a characterstic sequential dependency between mothers' positive expressive gestures and similar behaviours by children in both directions—with mother as the criterion and child as consequent, and vice versa. A comparison of panels **a** and **b** of Figure 11 shows, however, that for all three groups of mother-MH child dyads, there was a drastic reduction in strength of dependency going from mother as antecedent to child as antecedent. This difference in directionality would seem to suggest that for mother-MH child dyads, regardless of intervention, the sequential link was more mother-led than child-led. For the MA- and CA-comparison groups of dyads, however, there appeared to be a relative balance between mothers and children in lead-taking.

Multiple comparisons involving the mother-MH child dyads as a group and the nonhandicapped groups on the two sequences showed that the mother-led sequence was significantly stronger in the MH groups than it was in either the MA-comparison ($F=7.12$; $p<.05$) or CA-comparison ($F=13.02$; $p<.001$) nonhandicapped groups (Table 14a). On the child-led sequence, however, the only significant differences in degree of dependency were found between the nonintervention MH group on one hand and the short intervention MH ($F=8.89$; $p<.01$), long intervention MH ($F=6.00$; $p<.05$), and the nonhandicapped MA-comparison ($F=5.70$; $p<.05$) groups respectively (Table 14b). MH child-mother dyads, as a group, did not differ from the two groups of nonhandicapped child-mother dyads.

In the cross-time comparisons, the characteristic dependency of children's positive gestures upon similar behaviours by mothers remained relatively the same in degree for the MH child-mother dyads. Dyads in the MH groups continued to exhibit a significantly stronger

Table 12.1. Mean *Z-Scores* For Sequential Dependencies By Group (Main Comparisons)[1]

Antecedent	Consequent	Non Int.	Short Int.	Long Int.	MA Comp.	CA Comp.
M.Phys. contact	C.Smile	1.71	2.98	1.35	2.05	3.06
M.Pos. gesture	C.Pos. gesture	7.83	13.53	10.59	4.87	2.83
M.Look	C.Look	0.92	3.44	4.21	0.71	0.66
M.Verb. stim.	C.Pos. vocalize	0.11	0.39	1.01	1.60	2.69
M.Instruct	C.Comply	7.03	9.25	9.92	7.46	13.93
C.Pos. gesture	M.Pos. gesture	6.09	1.76	2.53	2.62	4.01
C.Smile	M.Smile	1.92	7.66	3.49	0.71	1.12
C.Look	M.Look	0.82	4.67	3.00	1.40	1.93
C.Pos. vocalize	M.Imitate	5.73	6.39	5.46	4.63	5.16
C.Pos. vocalize	M.Verbal stim.	1.20	1.84	1.30	2.82	2.43
C.Comply	M.Reinforce	2.92	5.64	6.43	3.89	10.30
Maternal Auto Lags						
M.Phys. contact	M.Verbal stim.	1.49	2.65	2.43	2.39	2.16
M.Instruct	M.Phys. guidance	2.83	2.94	4.83	9.86	7.30

[1]Underlined *z-scores* represent significant sequential dependencies.

Table 12.2. Mean Z-Scores For Sequential Dependencies By Group (Cross-Time Comparisons)[1]

Antecedent	Consequent	Non Int.	Short Int.	Long Int.	Younger MA	Older MA
M.Phys. contact	C.Smile	1.71	5.28	2.53	2.05	3.06
M.Pos. gesture	C.Pos. gesture	7.00	13.08	8.95	4.87	2.83
M.Look	C.Look	2.60	2.37	3.32	0.71	0.66
M.Verbal stim.	C.Pos. vocalize	1.05	1.32	1.20	1.60	2.69
M.Instruct	C.Comply	8.33	10.58	8.70	7.46	13.93
C.Pos. gesture	M.Pos. gesture	3.10	1.21	3.54	2.62	4.01
C.Smile	M.smile	0.56	2.93	2.47	0.71	1.16
C.Look	M.Look	3.91	6.44	3.89	1.40	1.93
C.Pos. vocalize	M.Imitate	2.61	3.95	2.67	4.63	5.16
C.Pos. vocalize	M.Verbal stim	2.09	1.29	3.06	2.82	2.43
C.Comply	M.Reinforce	4.69	7.39	6.22	3.89	10.30
Maternal auto lags						
M.Phys. contact	M.Verbal stim	1.68	1.18	2.20	2.39	2.16
M.Instruct	M.Phys. guidance	2.74	5.43	4.74	9.86	7.30

[1]Underlined *z-scores* represent significant sequential dependencies.

Table 13.1. Mean Z-Scores And F-values For Sequential Dependencies By Group[1] (Main Comparisons)

Antecedent	Consequent	Non Int.	Short Int.	Long Int.	MA Comp.	CA Comp.	Univ.F
M.Pos. gesture	C.Pos. gesture	7.83	13.53	10.59	4.87	2.83	5.24**
M.Instruct	C.Comply	7.03	9.25	9.92	7.46	13.93	3.49*
C.Pos. gesture	M.Pos gesture	6.09	1.76	2.53	2.62	4.01	2.76*
C.Pos. vocalize	M.Imitate	5.73	6.39	5.46	4.63	5.16	0.35
C.Comply	M.Reinforce	2.92	5.64	6.43	3.89	10.30	3.82*
M.Phys. contact	M.Verbal stim	1.49	2.65	2.43	2.39	2.16	0.72
M.Instruct	M.Phys. guidance	2.83	2.94	4.38	9.86	7.30	4.65**

Multivariate $F_{(28)(124)}=2.52$; $p<.001$ [*$p<.05$ **$p<.01$]

Table 13.2. Mean Z-Scores and F-Values For Sequential Dependencies By Group (Cross-Time Comparisons)

Antecedent	Consequent	Non Int.	Short Int.	Long Int.	Younger MA	Older MA	Univ.F
M.Phys. contact	C.Smile	1.71	5.28	2.53	2.05	3.06	1.06
M.Pos. gesture	C.Pos. gesture	7.00	13.08	8.95	4.87	2.83	3.72*
M.Instruct	C.Comply	8.33	10.58	8.70	7.46	13.93	5.38**
C.Pos. gesture	M.Pos. gesture	2.10	1.21	3.54	2.62	4.01	1.44
C.Pos. vocalize	M.Imitate	2.61	3.95	2.67	4.63	5.16	1.78
C.Pos. vocalize	M.Verbal stim	2.09	1.29	3.06	2.82	2.43	1.80
C.Comply	M.Reinforce	4.69	7.39	6.23	3.89	10.30	2.31
M.Instruct	M.Phys. guidance	2.74	5.44	4.74	9.86	7.30	3.48*

Multivariate $F_{(32)(123)}=2.18$; $p<.01$ [*$p<.05$ **$p<.01$ ***$p<.001$]

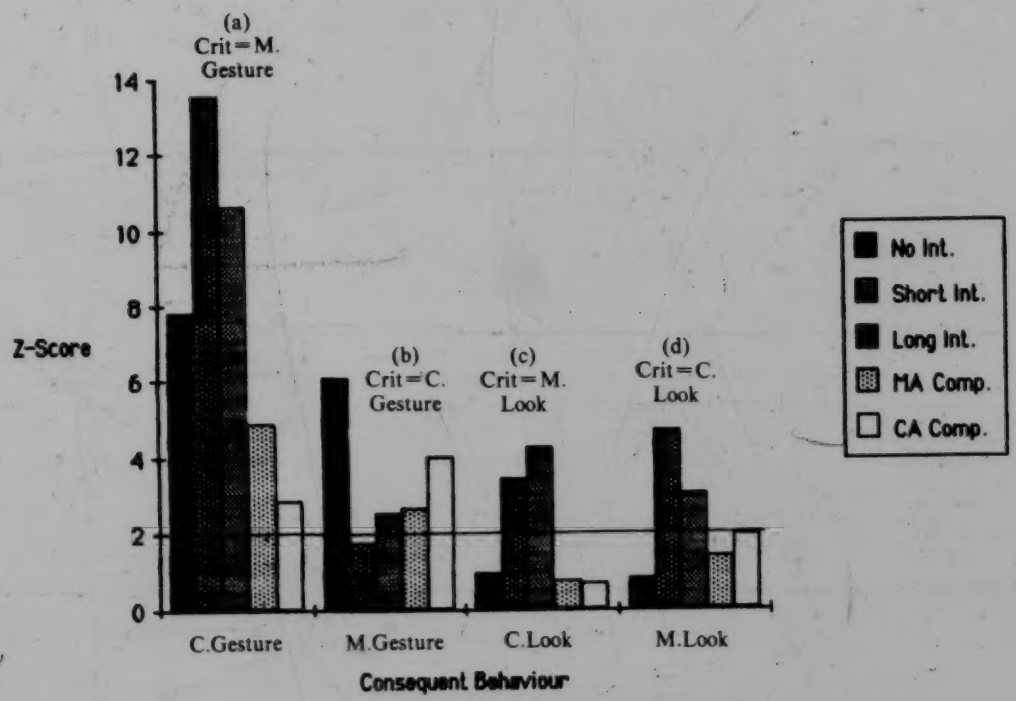

Figure 11. Reciprocal Expressive Gestures and Reciprocal Visual Regard

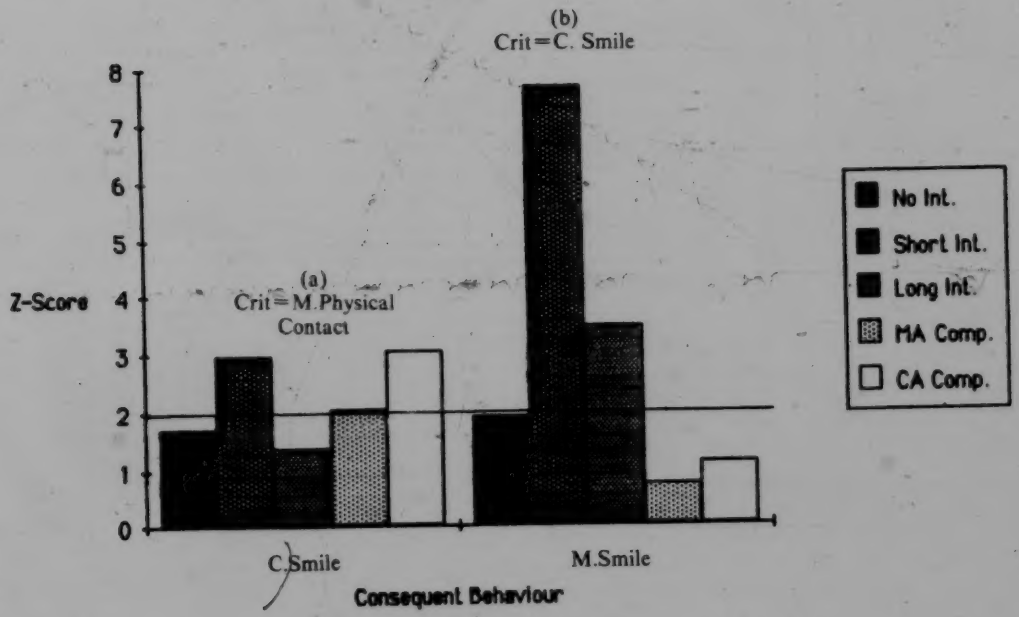

Figure 12. Smiling Responses

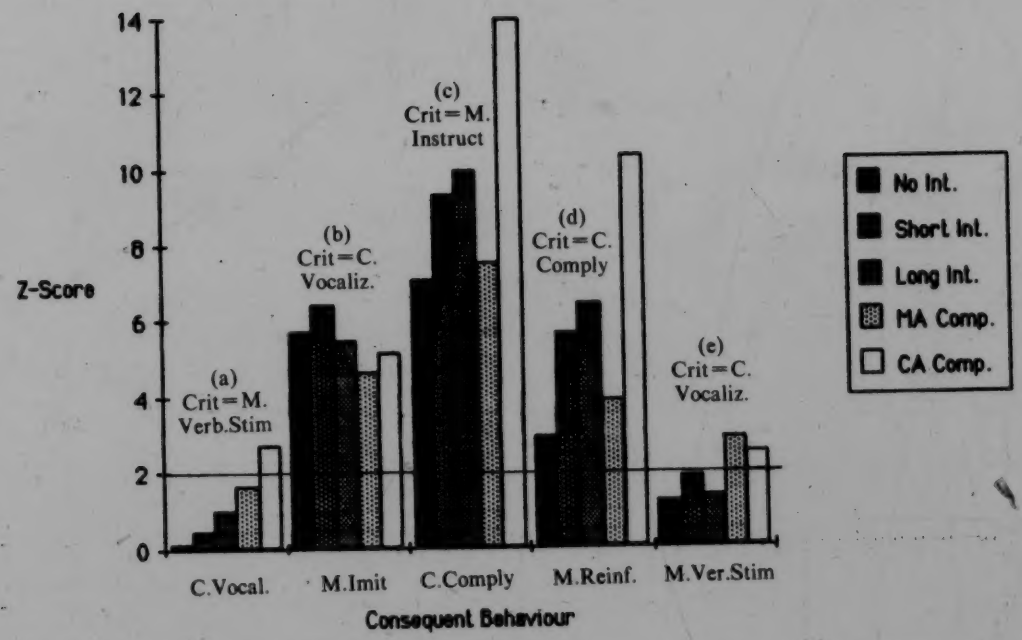

Figure 13. Patterns Involving Children's Positive Vocalizations and Compliance

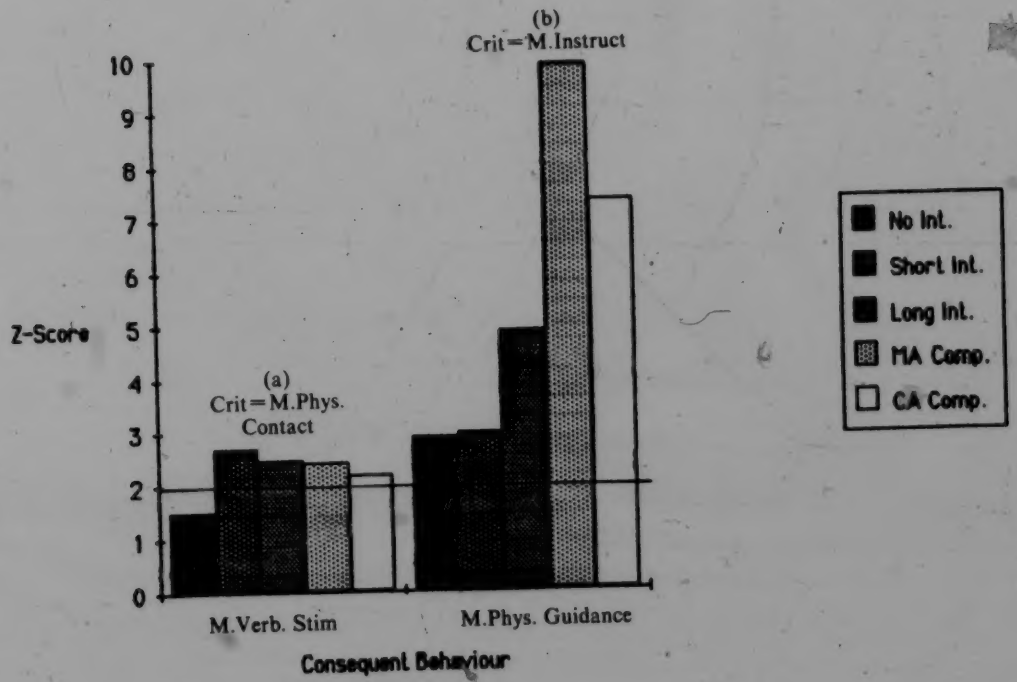

Figure 14. Maternal Auto Lags

degree of dependency than dyads in the younger ($F=4.16$; $p<.05$) and older ($F=8.42$; $p<.01$) nonhandicapped groups respectively (Tables 14a & 14b). The drastic reduction in strength of dependency going from mother as antecedent to child as antecedent was observed again at assessment 2, suggesting that the sequence remained mother-led in the MH groups. The significant difference observed between nonintervention MH dyads and the two intervention MH and original MA-comparison nonhandicapped dyads on the child-led sequence had, however, disappeared by assessment 2.

Thus while in all groups of dyads both mother and child tended to respond to each other's use of gestures to express intent, gain attention, or reference an environmental event/object to a significant degree, lead-taking was relatively balanced in the two nonhandicapped groups. Among the three MH groups, however, the sequence tended to be largely mother-directed. The replication of this pattern at assessment 2 when the mentally handicapped and nonhandicapped children were of comparable mental age was an indication that maternal dominance or lead-taking was unique to mothers of mentally handicapped children.

Reciprocal visual regard: The sequential pattern involving mother and child exchanging visual regard was only significantly characteristic of the two groups of intervention dyads in the main comparisons (Figures 11c & 11d). By assessment 2, however, this pattern was significant for all groups of MH child-mother dyads. Thus reciprocal visual regard between mother and child was an interactive characteristic which distinguished mother-handicapped child dyads from mother-nonhandicapped child dyads. This finding is consistent with the speculation made under maternal looking behaviour that visual contact may constitute an important strategy which mothers adopt frequently to invite and/or maintain social interaction with their mentally handicapped child. It may also be an indication that visual interactive games may be an important component of the interactions of mothers with their mentally handicapped children.

Table 14. Matrix of Significant F-values For Group Comparisons: Sequential Dependencies

(a) M.Positive Gesture/I.Positive Gesture (Main Comparisons)

	Non	Short	Long	MA-Comp	CA-Comp
Non	—	4.62*	NS	NS	NS
Short		—	NS	10.66**	16.26***
Long			—	4.65*	8.55**
MA-Comp				—	NS
Short + Long	NS			9.80**	16.13***
Non + Short + Long				7.12*	13.02***

(b) I.Positive Gesture/M.Positive Gesture (Cross-Time Comparisons)

	Non	Short	Long	MA-Comp	CA-Comp
Non	—	8.89**	6.00*	5.70*	NS
Short		—	NS	NS	NS
Long			—	NS	NS
MA-Comp				—	NS
Short + Long	9.83**			NS	NS
Non + Short + Long				NS	NS

Smiling responses: Two different characteristic sequential patterns involving smiling behaviour emerged from the analyses: (1) children's smiling in response to their mothers' initiation of physical contact (Figure 12a) and (2) mothers' smiling in response to their children's smiles (Figure 12b). The main analysis showed that children's smiling in response to their mothers' initiation of physical contact was a significant interaction pattern for only the short intervention MH and the two nonhandicapped groups. By assessment 2 this sequence had become a significant interaction pattern in the long intervention group as well. Thus only in the nonintervention group was this sequence not a characteristic interaction pattern.

The second sequence—mothers' smiling in response to their children's smiles—was a significant interaction pattern only for the two intervention MH groups at both assessment points. Thus while MH children in intervention, like their nonhandicapped comparison, characteristically responded to their mothers' initiation of physical contact with smiles, only mothers in the two intervention groups characteristically reciprocated their children's smiling

responses. This finding together with the findings on maternal looking and reciprocal visual regard underscored the prominence of affective responses in the interactions of mothers and their mentally handicapped children.

Children's vocal responses to mothers' verbal stimulation: As Figure 13a shows, the sequence involving mothers' verbal stimulation (nonspecific verbalizations) as antecedent and children's positive vocalizations as consequent was a significant interaction pattern only for dyads in the CA-comparison group. The three MH groups, like the MA-comparison group, did not show this characteristic pattern. Although all 3 MH groups manifested z-score increases in this sequence over the 6- to 7-month period, the pattern remained nonsignificant. Thus in terms of vocal responses to mothers' general verbalizations, developmentally older children tended to be more responsive than developmentally younger children.

Mothers' imitation of children's positive vocalizations: The behaviour code *imitate* was not designed to specifically record a mother's or a child's imitation of any particular behaviour of the partner. The code, depending upon which behaviour it followed, could reflect imitation of a verbal or nonverbal behaviour. The sequential analysis technique was thus very useful in examining mothers' imitation of children's positive vocalizations specifically. The main analysis revealed that mothers' imitation of children's vocalizations was a significant interaction pattern within all 5 groups of dyads. Figure 13b shows that the degree of dependency was similar for all groups. The MANOVA results (Table 13.1) confirmed the absence of significant differences apparent from Figure 13b. Although the strength of dependency of this sequence declined over time in the MH groups, mothers' imitation as the immediate response following children's positive vocalizations remained a significant interaction pattern.

Instruction-compliance sequence: In comparing the 5 groups of children on compliance with maternal verbal instructions, it was considered that raw frequencies or percentages of occurrence would mask the true relationship between this child behaviour and mothers' verbal instructions. Consequently, compliance with verbal instructions was recorded as

the proportion of mothers' verbal instructions with which the child complied. The sequential analysis procedure provided a complimentary picture of children's compliance with maternal verbal instructions.

Figure 13c shows that in the main analysis the sequence was significantly characteristic of all 5 groups of dyads. However, it is also clear from Figure 13c that developmentally older (nonhandicapped CA-comparison) children exhibited a much stronger degree of compliance than did developmentally younger (MH children and their mental age nonhandicapped comparison). This difference was confirmed by the MANOVA results (Tables 13.1 & 15a). In the 3 MH groups the strength of dependency of children's compliance upon mothers' instruction remained relatively unchanged over the 6- to 7-month period. The cross-time comparisons revealed similar patterns of differences as those found in the main comparisons (Table 15b).

Compliance-reinforcement sequence: Because several child behaviours could be reinforced by the mother, merely comparing amount (raw frequencies) of reinforcement was not expected to provide differentiated information on the reinforcement of specific child behaviours of interest. The sequential analysis technique made it possible to examine the extent to which reinforcement followed each of the child behaviours. The results showed that the only child behaviour occurring with a fair degree of frequency which elicited reinforcement to a significant degree was the child's compliance with verbal instructions. As shown in Table 13.1 and Figure 13d, maternal reinforcement of the child's compliance with verbal instruction was a characteristic pattern for all 5 groups in the main analysis. Multiple comparisons of the group means revealed that generally mothers of MH children, as a group, exhibited similar degrees of reinforcing compliance as did mothers of the nonhandicapped MA-comparison children. However, mothers of CA-comparison nonhandicapped children showed a significantly stronger degree of reinforcement than did mothers of MH children ($F=9.87$; $p<.01$). In fact, mothers of nonhandicapped CA-comparison children showed a significantly stronger degree of reinforcing compliance than did mothers of nonhandicapped MA-comparison children ($F=9.61$; $p<.01$). This evidence suggested that while reinforcement of compliance may be a

Table 15. Matrix of Significant F-values For Group Comparisons: Sequential Dependencies

(a) M.Instruct/I.Comply (Main Comparisons)

	Non	Short	Long	MA-Comp	CA-Comp
Non	—	NS	NS	NS	11.02**
Short		—	NS	NS	5.08*
Long			—	NS	NS
MA-Comp				—	9.71***
Short + Long	NS			NS	5.84*
Non + Short + Long				NS	9.38**

(b) M.Instruct/I.Comply (Cross-Time Comparisons)

	Non	Short	Long	Younger MA	Older MA
Non	—	NS	NS	NS	12.73***
Short		—	NS	NS	4.56*
Long			—	NS	11.09**
Younger MA				—	17.01***
Short + Long	NS			NS	9.96**
Non + Short + Long				NS	13.60***

(c) I.Comply/M.Reinforce (Main Comparisons Only)

	Non	Short	Long	MA-Comp	CA-Comp
Non	—	NS	NS	NS	12.76***
Short		—	NS	NS	5.08*
Long			—	NS	NS
MA-Comp				—	9.61**
Short + Long	NS			NS	5.67*
Non + Short + Long				NS	9.87**

common interactive characteristic of all mothers, mothers of developmentally older children may generally have a stronger tendency to reinforce their children's compliance than mothers of developmentally younger children.

The cross-time comparisons provided further support for this conclusion. By assesement 2 when the MH children were of comparable mental age as the two groups of nonhandicapped children the compliance-reinforcement sequence remained a significant interaction pattern for all groups but the significant difference in strength of dependency found between MH child-mother dyads and the 'original' CA-comparison group had washed out as a result of a dramatic z-score increase shown by the nonintervention and short intervention groups.

Child positive vocalization-mother verbal stimulation sequence: In the main analysis this sequence significantly characterized the interactions of the two groups of nonhandicapped child-mother dyads only (Figure 13e). By assessment 2, the nonintervention and long intervention dyads were also exhibiting this pattern to a degree similar to that of the nonhandicapped child-mother dyads. For the short intervention group, however, the sequence remained nonsignificant.

Unique maternal auto sequences

Auto sequences involving pairs of maternal behaviours were examined to identify unique maternal interactive strategies. Only two sequences appeared to significantly characterize the interaction styles of mothers (Figures 14a &14b). These sequences were: (1) verbal stimulation following initiation of physical contact and (2) physical guidance following intruction.

Verbal stimulation following physical contact: In the main analysis all mothers, except those in the nonintervention MH group, exhibited a significant pattern of verbalizing to their child immediately after initiating physical contact. The strength of dependency was similar for all four groups. By assessment 2 for the MH groups, only the long intervention mothers continued to exhibit this pattern significantly.

Table 16. Matrix of Significant F-Values For Group Comparisons: Sequential Dependencies

(a) M.Instruct/M.Physical Guidance (Main Comparisons)

	Non	Short	Long	MA-Comp	CA-Comp
Non	—	NS	NS	12.37**	5.01*
Short		—	NS	11.98**	4.77*
Long			—	7.49**	NS
MA.Comp				—	NS
Short + Long	NS			12.81***	4.42*
Non + Short + Long				12.81***	4.42*

(b) M.Instruct/M.Physical Guidance (Cross-Time Comparisons)

	Non	Short	Long	Younger MA	Older MA
Non	—	NS	NS	11.82**	4.85*
Short		—	NS	4.54*	NS
Long			—	6.76*	NS
Younger MA				—	NS
Short + Long	NS			7.46**	NS
Non + Short + Long				11.12**	NS

Physical guidance following instruction: The teaching strategy whereby verbal instruction was immediately followed by physical guidance was a characteristic interaction style for mothers in all 5 groups. For the 3 MH groups the pattern remained significant at assessment 2. In the main comparisons the strategy was stronger for mothers of nonhandicapped children than it was for mothers of MH children. The MANOVA results confirmed that the degree of dependency was stronger among MA-comparison ($F=15.73$; $p<.001$) and CA-comparison ($F=5.76$; $p<.05$) dyads than it was among the MH dyads (Table 16a). As Table 16b shows, however, only the difference between the MH groups and the younger MA-comparison was maintained in the cross-time comparisons.

Summary

Of the 10 unique patterns emerging from the analyses of sequential dependencies, 5 were common to all five groups of dyads in the study, one was unique to the nonhandicapped groups, while 2 were unique to the MH groups. The remaining two patterns—children's smiling in response to their mothers' initiation of physical contact and the maternal auto sequence involving verbal stimulation of the child upon establishing physical contact—did not show any clear consistency in terms of differentiating among groups.

First, interactions in all 5 groups of dyads were characterized by a significant pattern of reciprocal positive expressive gestures. That is, in all groups, both mother and child tended to respond to each other's use of gestures to express intent, gain attention, or reference an environmental event/object to a significant degree. It was found that among the two nonhandicapped groups, lead-taking was relatively balanced between mother and child; however, among the MH groups the sequence tended to be largely mother-directed. The replication of this pattern at assessment 2 when the mentally handicapped and nonhandicapped children were comparable in mental age was an indication that maternal dominance or lead-taking was unique to mothers of mentally handicapped children.

Second, all groups portrayed a characteristic pattern of maternal instruction being followed immediately by compliance from the child. However, developmentally older children tended to exhibit a stronger degree of compliance than did developmentally younger children. Third, maternal reinforcement immediately following the child's compliance was a significant feature of interaction in all 5 groups of dyads. At assessment 1 the degree of dependency of maternal reinforcement upon child compliance was significantly stronger in the CA-comparison group than it was in the other groups. By assessment 2 when the mental ages of the mentally handicapped and nonhandicapped children were comparable, this difference in the strength of dependency had disappeared. This confirmed the interpretation, implicit in the assessment 1 results, that mothers of developmentally older children may have the tendency to reinforce their children's compliance to a stronger degree than mothers of developmentally younger children.

The sequence involving mothers' imitation of their children's positive vocalization was the fourth pattern which characterized the interactions of all groups. No group differences emerged in terms of the strength of dependency. The final common sequential pattern for all 5 groups involved mothers's use of physical guidance immediately following instruction to the child. While mothers in all groups exhibited this pattern significantly, the degree of dependency was significantly stronger among mothers of nonhandicapped children.

Among the significant sequential dependency patterns, only one—children's positive vocalization immediately following mother's verbal stimulation—was unique to the interactions of mother-nonhandicapped child dyads. This sequence reached the level of significance only for the nonhandicapped CA-comparison group. Assessment 2 data for the MH groups showed that this sequence remained nonsignificant, although the mentally handicapped children were of comparable mental age with the nonhandicapped children. Seen in relation to the frequency data, this finding suggested that the difference between developmentally older and developmentally younger children, in terms of positive vocalization, was qualitative rather than quantitative. That is, the vocalizations of developmentally older children occurred typically in response to their mothers' verbal stimulation whereas the vocalizations of developmentally younger handicapped and nonhandicapped children did not tie in with their mothers' verbalizations in a characteristic pattern.

Finally, two distinct sequential patterns were unique to the interactions of mothers and their mentally handicapped children. At assessment 1, only in the two intervention groups of dyads was reciprocal visual regard a characteristic interaction pattern. By assessment 2, the pattern was significant for all three groups of MH child-mother dyads. Maternal smiling in response to the infant's smile, however, remained a significant interaction pattern only in the two intervention groups.

The above results from the qualitative analysis suggested that with the exception of affective responses mothers of mentally handicapped and nonhandicapped children were not very different in their responsiveness to certain key behaviours of their children. This finding

underscores the need for researchers to examine both quantitative and qualitative characteristics of mothers' interactions before making speculations regarding intervention.

D. A summary note

In presenting the results of the study in the preceding sections greater emphasis appears to have been placed on differences than on similarities between the two main populations under study. It is important to point out, however, that there were indeed more similarities than differences between the two categories of dyads. The virtual similarity between handicapped and nonhandicapped children has been alluded to already. With regard to mothers, both the frequency and sequential dependency analyses revealed several commonalities. No significant differences were found in terms of the frequency of smiling, imitation, verbal reinforcement, negative behaviours, labelling, and expansion. Qualitatively, interactions in all 5 groups of dyads were characterized by the following significant patterns: reciprocal gestural exchange; successful maternal elicitation of compliance with verbal instructions; consistent maternal reinforcement of children's compliance with instructions; maternal imitation of children's positive vocalizations; and maternal provision of physical guidance subsequent to issuing a verbal instruction. On these qualitative patterns, any differences occurring between groups were with regard to the strength of dependency as determined by the extent to which the *z-score* exceeded the significant level of 2.0.

V. DISCUSSION

The increasing number of comparative studies of parent-child interaction in the developmental literature over the past decade reflects a growing quest for a better understanding of the impact of a child's handicap on his/her mother's interaction style. Early studies comparing the interactions of mothers of nonhandicapped and mentally handicapped children commonly matched the two categories of children on the basis of chronological age (e.g. Kogan et al., 1969; Marshall et al., 1973; Buium et al., 1974). Conclusions to the effect that mothers of handicapped children exhibited unique interactive characteristics were often either explicitly made or implied in the presentation of results.

The use of the CA-match design in comparative studies has, however, attracted a great deal of criticism in more recent literature (see Rondal, 1977; Brooks-Gunn & Lewis, 1984; Leifer & Lewis, 1984; Marfo, 1984). The criticism is based on the view that mentally handicapped children do not function at the same level as nonhandicapped children of comparable chronological age and are therefore likely to interact in ways that are different from the interactions of nonhandicapped children of corresponding CA. Thus mentally handicapped and nonhandicapped children of comparable CA are likely to elicit different responses from their mothers. Consequently, when differences in maternal responses or style of interaction emerge in CA-match comparative studies, it is not altogether clear whether these differences are due to differences in the children's diagnostic status (handicapped vs nonhandicapped) or to differences in their general level of developmental functioning.

To classify any maternal interaction styles as constituting unique characteristics of mothers of mentally handicapped children, the researcher must demonstrate that these characteristics cannot be accounted for by factors other than the condition of handicap per se. An important factor which many of the early studies failed to control is children's overall level of mental development. In the present study, a dual comparison design was used to isolate differences in patterns of maternal interaction that are likely related to differences in children's level of developmental functioning from those that may be uniquely related to differences in

children's diagnostic status.

A striking finding in this study was that except for one consistent qualitative difference between mentally handicapped children and their nonhandicapped CA-comparison, similar patterns of interaction were observed between handicapped and nonhandicapped children. The qualitative difference observed was with regard to the relationship between children's positive vocalizations and their mothers' verbal stimulation. The sequential analysis showed that only in the nonhandicapped CA-comparison group did children's positive vocalizations follow maternal verbal stimulation as a significant interaction pattern. Evidence from previous research supports this finding. Buckhalt et al. (1978) reported that while the vocalizations of nonhandicapped infants occurred typically in interaction with their mothers, the vocalizations of Down syndrome children showed little relationship with maternal activity. Since Buckhalt and his associates matched handicapped and nonhandicapped children on CA only, it was not possible to determine how mental age differences influenced their results. However, one study which matched Down syndrome and nonhandicapped children on the basis of developmental age (Jones, 1980) found Down syndrome children to vocalize with lesser consideration for their role in vocal dialogue. In the present study, however, similar patterns were observed for mentally handicapped children and their nonhandicapped MA-comparison. Thus, the apparent failure to contribute reciprocally to vocal dialogue was true of developmentally younger children in general and not just mentally handicapped children.

Of even more striking interest was the finding that despite the indication that the interactions of mentally handicapped and nonhandicapped children were not very different, the mothers of these children exhibited several differences in their interaction patterns. Two alternative hypotheses were examined regarding the source(s) of these differences. The first hypothesis stated that differences between mothers of handicapped and nonhandicapped children would be explained by mental age differences between the two categories of children. The second hypothesis stated on the other hand that mothers of handicapped and nonhandicapped children would differ regardless of mental or chronological age comparability

between their two categories of children. If the first hypothesis were supported it would be an indication that the presence of a handicap in a child does not lead necessarily to unique maternal interaction styles. On the other hand, support for the second hypothesis would be an indication that the presence of a handicapping condition in a child does give rise to unique maternal interactions.

The results of the study were mixed in the sense that some support was found for both hypotheses. Results from the main frequency analyses showed that differences between mothers of handicapped and nonhandicapped children in terms of the frequency of physical contacts and positive expressive gestures were related to mental age differences between handicapped and nonhandicapped children. On those two behaviour categories the main analysis showed that mothers of handicapped children were similar to mothers of nonhandicapped MA-comparison children but different from mothers of CA-comparison children. As the handicapped children grew older and attained mental age comparability with the two groups of nonhandicapped children, this difference disappeared, confirming the mental age difference explanation. The correlational analyses performed on the 27 mother-handicapped child dyads confirmed this relationship by indicating that several of the behaviours of mothers were related to their children's level of developmental competence. They made significantly more physical contacts with their children than did mothers of developmentally older nonhandicapped children but the correlational data revealed that they made fewer physical contacts with children who were developmentally older—mentally, chronologically, motorically, and liguistically. Similarly, although mothers of mentally handicapped children exhibited significantly fewer positive expressive gestures than did mothers of developmentally older nonhandicapped children, the correlational analysis showed that they directed more positive expressive gestures to developmentally more competent children.

On several other behaviours on which they did not differ from mothers of nonhandicapped children, mothers of handicapped children appeared to regulate their behaviour to match their children's level of developmental competence. For example, mothers

consistently directed more negative behaviours at chronologically older and motorically more competent children while providing more verbal reinforcements to and engaging in more play stimulation activity with developmentally younger and less competent children.

The finding that mothers of mentally handicapped children in this study responded to their children according to the child's level of developmental functioning is consistent with findings from several previous studies. Recently, Brooks-Gunn and Lewis (1984) have reported that it is children's mental age rather than their chronological age or handicapping condition which influences maternal level of responsivity. Buckhalt et al. (1978) also found in a CA-match study that although mothers of mentally handicapped children made significantly more utterances than mothers of nonhandicapped children, frequency of maternal utterance correlated highly with children's mental age in both groups. In a very well controlled study involving 42 mentally handicapped and 40 nonhandicapped children matched at three levels of mental development, Terdal et al. (1976) found mothers of lower functioning or developmentally younger children to be more controlling than mothers of higher functioning children in both the handicapped and nonhandicapped groups. In the language literature, it has been shown that mothers do simplify their speech to match their children's level of linguistic competence (Broen, 1972; Baldwin & Baldwin, 1973; Newport, 1976). In the present study, both the MANOVA and correlational results provided comparable evidence, namely that several of the behavioural interactions of mothers of mentally handicapped children were related to their children's level of developmental competence as measured by mental, motor, and language age equivalents.

Despite the above evidence, however, the frequency analyses revealed two characteristics which were shared only by mothers of mentally handicapped children. These mothers looked at their children and instructed them significantly more often than did mothers of nonhandicapped mental and chronological age-comparison children respectively. Thus, regardless of their children's mental or chronological age comparability with nonhandicapped children, mothers of handicapped children characteristically exhibited higher levels of looking

and instructional behaviour. The correlational analyses revealed that at both assessment points the frequency of looking and intstruction among mothers of handicapped children did not show significant correlations with any of the five developmental characteristics of their children: CA, mental age, psychomotor age, expressive language age, and receptive language age.

An additional interaction pattern distinguishing mothers of handicapped children from mothers of nonhandicapped children emerged from the sequential dependency analysis. The interactions of all groups of dyads in the study were characterized by a significant pattern of reciprocal use of expressive gestures between mother and child. However, it was found that while lead-taking was relatively balanced between mother and child in the two nonhandicapped groups, the exchange tended to be largely mother-directed among dyads with handicapped children.

These results demonstrated that although mothers of mentally handicapped children, like all mothers, regulate their behaviour in accordance with their children's level of developmental functioning, they differ from mothers of nonhandicapped children in several ways that are not determined by their children's general level of mental development. On the basis of the last general statement, the present study contradicts conclusions reported by Rondal (1977) and O'Kelly-Collard (1978) while supporting a more recent study by Davis and Oliver (1980) in which clear differences emerged between mothers of mentally handicapped and nonhandicapped children regardless of the fact that the children had been matched on language ability. Rondal (1977) matched 21 Down syndrome and 21 nonhandicapped children at three levels of linguistic competence as measured by the mean length of utterance (MLU) and found no differences on 20 measures of maternal speech between mothers of handicapped and nonhandicapped children. Similarly, O'Kelly-Collard (1978) matched 6 Down syndrome and 6 nonhandicapped children on mental age as well as on expressive and receptive language age. She found no differences in the characteristics of maternal speech (e.g. rate) directed at mentally handicapped and nonhandicapped children.

It is important to point out, however, that the present study differs from the Rondal (1977) and O'Kelly-Collard (1978) studies in several respects. First, those two studies involved Down syndrome children exclusively while the present study included Down syndrome and several other categories of mentally handicapped or developmentally delayed children. Second, while the present study examined general behavioural interactions, the Rondal and O'Kelly-Collard studies focused exclusively on linguistic characteristics of maternal speech. What is common between the present study and those two previous studies is the control of mental and or linguistic competence in an attempt to determine whether a child's handicap per se influences maternal behaviour in a unique way.

Contrary to the conclusions of the Rondal (1977) and O'Kelly-Collard (1978) studies, the present study provides strong evidence that independent of mental age or developmental competence, the child's diagnostic status gives rise to such unique interactive characteristics as increased visual regard of child, excessive instructional behaviour, and maternal dominance in reciprocal gestural exhanges. The finding that mothers of mentally handicapped children look at their children more often than do mothers of nonhandicapped children has no parallel in previously reported comparative studies. Also, none of the studies reviewed has reported results directly on maternal lead-taking or dominance in the context of reciprocal gestural exchanges. However, data on maternal dominance during free play interactions have been reported in two studies. Jones (1980) found a significantly higher frequency of mother-directed play sequences in the interactions of mothers and their mentally handicapped children; the interactions of mothers and their nonhandicapped children, on the other hand, were characterized by significantly higher frequency of child-directed play sequences. Eheart (1982) has reported that among dyads with mentally handicapped children, more interactions occurred around mother-introduced toys whereas among dyads with nonhandicapped children more interactions occurred around toys introduced by children.

Turning now to instructional behaviour, findings similar to the one obtained in the present study have emerged from several CA-match studies using various definitions of

instructional behaviour. Kogan et al. (1969) found mothers of 3- to 7-year old mentally handicapped children to issue orders significantly more often than mothers of nonhandicapped children of comparable CA. In their study on the use of four verbal operants (mands, tacts, intraverbals, and echoics) by mothers and their children, Marshall et al. (1973) reported no differences between mothers of mentally handicapped and nonhandicapped children in their use of tacts, intraverbals, and echoics. However, mothers of mentally handicapped children used mands (demanding, commanding, asking, or requesting) significantly more often than did control group mothers. Breiner and Forehand (1982) also found mothers of mentally handicapped children to issue more commands to their children than mothers of nonhandicapped children of comparable CA. In a more recent CA-match study, Stoneman et al. (1983) have reported a significantly more frequent use of both verbal and nonverbal commands by mothers of 4- to 7-year old mentally handicapped children compared to mothers of nonhandicapped control children.

Coming from CA-match studies, this finding, although consistent across several studies, would have been of a relatively less pronounced importance. However, a similar finding has emerged from two previous studies in which mentally handicapped and nonhandicapped children were matched on the basis of mental age. Cunningham et al. (1981) found a significantly higher frequency of commands among mothers of mentally handicapped children compared to mothers of nonhandicapped children of comparable MA. Finally, Eheart (1982) reported that mothers of mentally handicapped preschoolers issued more than three times as many directives as mothers of nonhandicapped children of comparable cognitive level.

Controlling or directive behaviour has frequently been identified in the mother-child interaction literature as the most unique interactive characteristic of mothers of developmentally delayed and high risk infants and young children (see Field, 1980, 1982, 1983 for reviews). Directiveness is frequently defined in this literature either in terms of the frequency of instructions (or commands and orders) or in terms of lead-taking and dominance. The present study, by its use of a dual comparison design, has, along with other studies

employing MA-match designs (e.g. Jones, 1980; Cunningham et al., 1981; Eheart, 1982) provided more convincing evidence that the pattern of directiveness frequently reported in CA-match studies does, indeed, represent a unique characterstic of mothers of mentally handicapped children.

Two important questions that need to be raised in connection with this finding have to do with: (a) why mothers of mentally handicapped children tend to be directive and dominating in their interactions, and (b) what implications such a finding has for the development of the handicapped child and for applied research and/or programs. The response to both questions can only be speculative at this stage since neither question has been addressed directly through empirical research.

With regard to the first question, Davis and Oliver (1980) have invoked the attribution theory of George Kelly in their attempt to provide a speculative explanation. Kelly (1955, cited in Davis & Oliver, 1980, p. 142) theorized that "individuals do not simply react to events, but rather that their behaviour is determined by the ways in which they perceive or construe the world." Applying this viewpoint, Davis and Oliver have stated:

> *If this is the case, then it can be argued that it is not the behaviour of the retarded child that makes the mother behave differently, but the way she construes the child. Construing the child as 'handicapped' or 'retarded' is the important determinant, regardless of the child's actual behaviour. It is possible, for example, that the construct 'retarded' might be closely linked to such constructs as 'has a limited behavioural repertoire' and 'needs to be cared for.' If such a view were accepted, it is not too difficult to believe that the mother might attempt to behave both for herself and on behalf of the child...*(pp. 142-143).

Consistent with the above viewpoint is Field's (1980, 1983) suggestion that high levels of activity among mothers of handicapped and biologically high-risk children may be a direct result of the frustration of receiving minimal levels of response from the child, a phenomenon which literally forces these mothers to engage in interaction patterns which appear to make up for the child's inadequate responding.

An alternative explanation suggested by Field (1980, 1983) is that maternal dominance and directiveness among mothers of handicapped and high-risk children may reflect strategies for teaching that these mothers have come to employ in their efforts to get their children to

perform at the level of their agemates. In fact, this alternative explanation appears more plausible, especially in relation to (a) the subject population from which the mentally handicapped children in this study were drawn, and (b) the specific results of the study. Over the past two decades, early intervention programs for disadvantaged and handicapped children have become prevalent in North America. One major impact of the early intervention movement on parents of handicapped children has been in the form of higher expectations about handicapped children's developmental potential. Although models and techniques of intervention vary from one program to another, the primary objective of most programs is the enhancement of the child's growth and development (Kysela & Marfo, 1983).

The role of the parent, usually the mother, in this intervention process has been increasingly recognized as a crucial factor, especially since Bronfenbrenner's (1975) analysis of variables considered critical to the success of intervention. In a recent review and analysis of 21 studies reporting evaluative data on early intervention with mentally handicapped infants and young children, Marfo and Kysela (in press) underscored the importance attached to parent involvement when they reported that in 90% of the programs evaluated parents were trained to play a definite role in the intervention process. The most common role played by the mother in these programs was that of a teacher of her own child. It is instructive to point out, again, that in the present study 18 of the 27 dyads with mentally handicapped children were participants in early intervention programs. Most of those programs utilized a parent training-didactic approach. Even the 9 nonintervention dyads were on waiting lists for entry into intervention and it may be argued that the mothers in this group were not unaware of their potential role in their child's development and learning. In fact, it is conceivable that one reason why no clear differences emerged between intervention and nonintervention mothers (as well as children) may have been that nonintervention mothers, while waiting, were probably informally working with their children in ways that may not have been very different from experiences available to intervention dyads. The high levels of instructional behaviour found among mothers of mentally handicapped children in this study may thus reflect the direct or indirect impact of an

early intervention movement which is making 'instructors' of mothers.

The second question relating to the implications of maternal directiveness is a relatively more difficult one. Several other issues need to be considered in any attempt to address that question. There is a disturbing tendency in the literature to place value judgements on interaction patterns that are unique to mother-handicapped child dyads. For example, the expressions 'difficult' and 'disturbed' have often been used to describe patterns of interaction that are different from the so-called normal interaction patterns of mothers and their nonhandicapped children. It is not being suggested that these expressions are inappropriate in all cases of their use; however, it is the view of this author that different does not necessarily imply 'difficulty' or 'disturbance.' It can be argued that because mentally handicapped children are by definition limited in their information processing abilities, excessive instructional behaviour on the part of their mothers may be detrimental in terms of information overload. On the other hand, these children, again by virtue of the fact that they are limited in their ability to process information, would require a great deal of concrete instruction for their optimal learning and development. In fact, there is some evidence from previous research to suggest that for younger children some amount of directiveness may be appropriate. Nonhandicapped 18- to 24-month-old infants have been found to produce a high frequency of appropriate responses following directive questions (Leifer, 1979; Leifer & Lewis, 1978; Shatz, 1977). In a recent study on children's acquisition of conversational response skills, Leifer and Lewis (1984) have reported a similar finding on 18- to 23-month-old mentally handicapped infants. These researchers observed: "Although on the whole retarded children at this age produced very few appropriate responses to maternal questions...an analysis of individual question types showed that they produced many more appropriate responses following directive questions" (p. 615).

Unfortunately, neither the present study nor previous research has examined maternal directiveness in relation to how much of it is necessary to provide an optimal learning environment for the mentally handicapped child. Until such research is done the exact implications that findings such as the ones made in this study have for applied programs will

remain unclear. So far the only identifiable study to have examined the implications of maternal directiveness for mentally handicapped children's development of competence was done on much older children (Herman & Shantz 1983). These researchers confirmed the finding that mothers of mentally handicapped children tend to be more directive. More importantly, however, they found also that 10 year-old mentally handicapped children who provided the least number of solutions in a social problem solving situation had mothers who were more directive. If the findings of this study are replicated in studies controlling for children's level of developmental competence, the issue of maternal directiveness would become all the more important.

The present study sought also to examine the impact of participation in an early intervention program on dyadic interactions. The results of the study showed that participation in intervention did not make any notable impact on the interactions of mothers and their mentally handicapped children. It is pertinent to point out, however, that the only consistent differences to emerge between intervention and nonintervention dyads, however minor, were related to 'quality' and not 'quantity' of interaction. In the main analysis, only the two intervention groups of dyads exhibited a significant pattern of reciprocal visual regard. By assessment 2, however, the nonintervention group was exhibiting a similar pattern too, suggesting that high levels of reciprocal visual regard were unique to dyads with mentally handicapped children in general and not just to dyads in intervention. The only pattern to remain unique to the intervention groups across time was that involving mothers' smiling in response to their children' smiles.

While it is difficult to explain the relationship between intervention and the characteristic affective pattern involving smiling responses, the absence of any marked differences between the intervention and nonintervention groups is less difficult to explain. The intervention programs from which the two intervention groups were drawn were not specifically designed to emphasize or enhance dyadic interactions. It is conceivable also, as pointed out in the last section, that nonintervention mothers may not have been very different from intervention mothers

in terms of their awareness of the value of early intervention and of their own role in that process. Consequently they may have provided their children with experiences that may not have been very different from those available to children receiving intervention formally.

A few concluding remarks about the strengths and limitations of this study are in order at this point. The strengths of this study obviously lay in its use of a design which combined a dual (CA and MA) comparison procedure with a short term longitudinal design. The dual comparison made it possible to separate effects due likely to handicapping condition from those that were more likely due to differences in children's level of developmental competence. Although repeated measures were available only on the 27 dyads with mentally handicapped children, a supplementary analysis involving a cross-time comparison of assessment 2 data for the three handicapped groups with the only data set for the two nonhandicapped groups afforded a rare opportunity for a within-study replication.

The results of the study clearly demonstrated the utility of the design. For example, in the absence of a nonhandicapped mental age comparison group, mothers of mentally handicapped children would have been shown (although rather erroneously) to exhibit more unique interaction patterns than there really were. It was demonstrated through the use of a mental age comparison group that the apparently higher levels of physical contact and lower frequency of positive expressive gestures were characteristics shared by mothers of developmentally younger children in general and not just by mothers of mentally handicapped children. The repeated measures taken on the handicapped groups, in turn, provided an opportunity to confirm the above conclusions and to replicate differences between mothers which appeared to defy mental as well as chronological age comparability between handicapped and nonhandicapped children.

The above strengths notwithstanding, the results of this study may be limited in their generalizability basically because neither the overall subject selection nor group assignment was strictly random. However, given the nature of the main subject population of interest—mentally handicapped children—and the additional constraint of recruiting

intervention and nonintervention children who would be comparable on both mental and chronological age, the lack of randomization may be a worthwhile price. By its replication of results obtained in other studies, this study has nevertheless contributed to the generalizability of the finding that the interactions of mothers of mentally handicapped children tend to be characterized by directiveness and dominance. There is the need, then, for future research to address closely the issue of (a) how much maternal directiveness is consistent with an optimal learning environment for the mentally handicapped child, and (b) in what ways, and to what extent excessive directiveness on the part of the mother may jeopardize the child's development of competence.

To conclude on a methodological note, there is the need for future research to also go beyond chronological and mental ages of children as the criteria for group comparisons. While mental age may provide a rough index of general level of cognitive development, it is doubtful if all child behaviours in the interactive context are related to this index. For example, the frequency of children's initiation of physical contact or pointing and physical gestures may be related more to an index of motor development than to overall cognitive development. Thus the selection of matching criteria in comparative studies should be made on the basis of the nature of the specific behaviours of interest and how these behaviours may be related to several indices of developmental competence.

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APPENDICES

A. The Parent-Child Behaviour Observation System

B. Sample Computer Record of Dyadic Interaction: ODIN Output

C. Parent-Child Interaction Data

D. Sample Early Intervention Progam Activities

APPENDIX A. THE PARENT-CHILD BEHAVIOUR OBSERVATION SYSTEM

An Instrument for Observing and Recording Mother-Child Interactions in the Home Setting

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Introduction

The Parent-Child Behavioural Observation (PCBO) system has been designed to provide a measure of the patterns of interaction between a mother/caregiver and her infant or young child. The interactive behaviours of the child and mother are recorded by a trained observer through the use of a set of codes. In the sections which follow, a listing of the behaviour categories with their numerical codes is provided. This is followed by a detailed description of the categories and the procedures for observation and recording. This document also includes an operator's manual on the use of the electronic device, **DATA MORE**, for collecting, verifying, and storing data.

Behaviour Categories

Child Behaviour Category	Maternal Behaviour Category
01 Physical contact	21 Physical contact
02 Expressive gesture positive	22 Expressive gesture positive
03 Expressive gesture negative	23 Expressive gesture negative
04 Smile	24 Smile
05 Look	25 Look
06 Imitate	26 Imitate
07 Activity with materials	27 Stimulation with materials
08 Vocalization positive	28 Verbal reinforcement
09 Vocalization negative	29 Verbal negative
10 Aggressive-destructive	30 Verbal stimulation
11 Comply with verbal instructions	31 Label
	32 Expand
	33 Give instructions
	34 Physical guidance

Observation Situation Codes

01 Structured situation

02 Unstructured situation (Free Play)

03 Mother-child separation

General procedures for observation

The PCBO will be used to record mother-child interactions at 8-week intervals for both the Comparison and Intervention Groups. This will be accomplished by combining the observation procedure with each full assessment visit to the family (four assessments for Comparison Group and three assessments for Intervention Group at 6-month intervals), and by arranging for additional visits between the assessments. This will provide approximately 12 samples of parent-child interaction for the Comparison Group and approximately 8 samples for the Intervention Group.

During the period of observation, the interaction between the parent and the child will be the major focus. Interactions with others in the home or with the observer will not be recorded. The same parent or primary caregiver will be observed on each occasion.

A single sample of parent-child interaction includes the following observation situations:

01 Structured situation[3] The parent is asked to engage in the following activities with her infant. Each activity is observed for a maximum of 2 minutes and interaction is recorded

1. drinking from a cup (self-help)
2. following verbal commands (receptive language)
3. playing peek-a-boo (object permanence)
4. playing pat-a-cake (social)
5. grasp/manipulation of toy (motor)

The above tasks are adjusted to suit the infant's level of functioning.

02 Unstructured situation[4]

The parent and child are observed in free play situations. Fifteen 2-minute samples of parent-child interaction are recorded. The total 30 minutes of observation need not be recorded in one session.

03 Mother-child separation[3]

With another adult (beside the observer) in proximity to the child, M leaves the room for a 2-minute period. Behaviour is recorded at time of separation and reunion for M and I. I's behaviour during the interval of separation is also recorded.

In addition to the recording of parent-child interaction in these specific observation situations, the observer will make brief notes about the general setting and the health of the mother and child at that time. The following information will be included:

- mother and child's apparent health
- location of the observation within the home
- other persons present
- background sound: TV, radio, etc.
- time of day
- any unusual circumstances—significant events immediately prior to or during observation which might affect child or mother.

Coding guidelines

The behaviours of the parent and child to be coded or recorded are those which are primarily interactive or potentially interactive in nature. While the coding categories of the

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[3]Based on video program, PEEP, of the Louisiana State University's Development Centre for Children.

[4]The present study involves data from free play interactions only.

PCBO instrument provide the basic framework or description of the behaviours to be recorded, they do not necessarily identify or include examples of all of the behaviours which may occur during the observation period. Split-second observer judgements may have to be made. The basic guidelines include:

- only interactive behaviours between mother and child are coded; interactions with others are not coded.
- a behaviour is recorded each time it occurs; for example, in a situation of physical contact (such as mother holding child), each instance of physical touching (M hugs, strokes head, kisses, while holding child) is recorded separately.
- simultaneously occuring behaviours are all recorded using their respective codes.
- for the child behaviour category, *activity with materials (07)*, the duration as well as the occurrence of the behaviour is to be recorded; the observer will record the beginning and the end of the child's activity or play by the use of an on-off toggle switch on the DATA MORE device; this is the only behaviour category for which duration will be recorded.

BEHAVIOUR CATEGORIES AND CODES: DEFINITIONS AND EXAMPLES

Infant Behaviours

01 Physical contact

Behaviours coded under this category are the infant's physical contacts with M which are primarily affectionate or neutral. Agressive physical contacts (hits etc.) are recorded as code 10. Each instance of physical contact is recorded separately. For example, 01 would be recorded twice for the infant who climbs onto M's lap (01) and then holds her hand (01). Similarly, behaviours which occur during an extended period of physical contact (e.g. being held) are recorded separately (e.g. looks, vocalizes). The infant's physical contact while exploring or or playing with items of M's clothing, jewellery, etc. are recorded as code 07—activity with materials.

Examples: I. holds M., clings to M., hugs M., climbs onto M's lap, kisses M., holds M's hand, touches M's hair.

01 Expressive gesture positive

This category includes non-verbal behaviours which are directed to M. The I's use of gestures to express a need or an intent, to respond to M., or to attain or direct M's attention is recorded. Gestures which are negative or resistant are code 03.

Physical movements which are self-stimulatory, reflexive, or locomotive are not included; the gesture must be M-directed. Instances of joint reference (both M and I looking at the same person or object) will be recorded with this code but will be the end point of a sequence of codes representing the process of joint referencing. The sequence would involve I or M gaining visual attention (05, 25), gestural (02, 22) or verbal (08,33) direction of attention. I. and M. joint referencing or attending to something simultaneously will be coded as 02, 22.

Also included in this category is the infant's participation in interactive games involving body movements; e.g. *pat-a-cake*, action songs, finger plays. Physical contact occurring within the game framework will not be recorded separately. In all these instances, physical contact will be recorded separately using code 01.

Examples: I. points, shows, gestures, directs, draws or gains attention non-verbally; I. receives or takes something from M; I. gives to M: I. looks at something with M; I. claps or plays with M.

03 Expressive gesture negative

Behaviours coded under this category are the infant's non-verbal expression of rejection or resistance to a maternal behaviour. Aggressive or destructive behaviours are coded 10. Physical contact which is not primarily aggressive, will also be recorded separately (code 01).

Examples: I. resists M or object offerd by M; I. turns away; I. moves away from, ignores, or rejects M.

04 Smiles

All infant smiles toward M will be recorded. Distinctions between reflexive and social smiles will not be made. Smiles toward others will not be included. I. smiles will not be considered imitative unless an obvious imitative sequence can be identified.

Examples: I. smiles, laughs at, with, or toward M.

05 Looks

This category includes all infant looks, glances, or gazes at M. Looks at others or at objects are not included. Eye contact does not have to be established nor is the duration of the gaze a criterion for coding.

Examples: I. looks at M; I. glances at M.; I. looks to locate M; I. catches M's eye; I. gazes into M's eyes; I. establishes eye contact with M; I. looks at M during an activity.

06 Imitates

This code is used for any I. behaviour which is an immediate and obvious imitation of any M behaviour, or an immediate and obvious imitation of a sound or movement of a toy or object. The imitated behaviour may be verbal or non-verbal. I's imitation may be a close approximation but must be an obvious and immediate imitative behaviour.
Other behaviours may occur simultaneously with imitation, but a behaviour will not be considered imitative if other behaviours precede or intervene between M's behaviour and I's duplication of it.

Examples: M. claps hands (22); I. claps hands (imitates: 06) and laughs (04); M claps (imitates: 26); I. claps (06). M claps hands (22); I. reaches for M's hands (02); M smiles (24); I claps hands (02—not imitation.

07 Activity with materials

The purpose of this category is primarily to record a situation rather than to record discrete behaviours. I. play or activity with materials, toys or objects involves a complex variety of behaviours which are not necessarily interactive in nature. Specific skills with toys or independent play behaviours are not seen as measures of interaction. However, I. play does provide a potential situation for a backdrop to interaction with M. Therefore I's activity with materials will be recorded by the use of a toggle switch on the DATA MORE device. The toggle switch allows a continuous situation to be recorded at the same time as specific interactive behaviours are recorded. The duration of the activity is also measured. In other words, while I. is playing, the M-I interaction in that situation may be described by the use of any other behaviour categories. This in turn may be contrasted with the interaction in situations in which the I. is not playing with materials.

This category includes I's play with, manipulation of , or exploration of materials, objects, toys. The objects may have been given by M (code 27) or discovered by I. in the environment. One or many objects may be involved. Destructive activity is not included (code 10). Immediate I. imitation of M's activity with an object will be coded as 06. I's

acceptance or taking an object from M will be coded as 02—expressive positive gesture.

Examples: I. picks up, grasps, holds object; I. rolls, bangs, drops, tosses, bounces, taps, opens, closes, squeezes object; I touches, strokes, explores, turns over, manipulates object; I. plays, including I's response to M's instructions, modelling, or physical guidance in using an object or doing an activity involving materials.

08 Vocalization positive.

All I. vocalizations regardless of linguistic form, are included in this code with the exception of negative vocalizations (code 09) and imitations of M's vocalizations (code 06). Each phrase or sequence of sounds is recorded separately.

Example: I's single sounds, words, phrases; I. calls M, labels or names; I. babbles, talks to M, crows excitedly; I. expresses need or wish through vocalization.

09 Vocalization negative.

Infant vocalizations of distress, anger, or negative reaction are included in this category. The vocalization must be extreme and disruptive to be distinguished from *positive* expression of need.

Examples: I. cries, screams, yells, shrieks.

10 Agressive-destructive

Intentional and extreme I. behaviours which are obviously aggressive towards M or self, or are destructive of materials, are recorded with this code.

Examples: I. intentionally hits or hurts self or M; I. bites, kicks; I. tears, smashes, throws object; I. bangs head or engages in similar self-abuse.

11 Compliance with verbal instructions

This code includes I's immediate compliance with M's verbal instructions. It records I's compliant response to M instructs (code 33) or M verbalizaion negative (code 29). The I's compliance is primarily nonverbal and doe not necessarily involve manipulation off materials. These behaviours will be recorded separately if they occur or are part of M's instructions.

Examples: M's instructions for which I's compliance would be coded as 11: *come here; sit down; get your doll; open the door; stop that; don't do that.*
Corresponding behaviours which will coded separately or in addition to 11: I. plays with dolls (07); I. vocalizes (08 or 09); I. resists, ignores M. (03).

Maternal Behaviours

21 Physical contact

Behaviours coded under this category are M's physical contacts with I which are primarily affectionate or neutral. Negative or punishing physical contacts are recorded under code 23. Each instance of physical contact would be recorded twice if M picks up I. (21) and then rocks I. (21). Similarly, behaviours which occur during an extended period of physical contact (e.g. holding) are recorded separately (e.g. smiles at I., sings to I.).
The major criterion for this code is that M's touching of I is not mediated by or part of

another interactive behaviour such as exchange of materials (code 22 or 27) or gestural games (code 22). Physical contacts by M during feeding, changing or dressing activity will be recorded however. The distinction between the above situations is one of incidental touching versus initiated or affectionate touching. The feeding, changing or dressing situation will be identified by the observer's use of a situation code (see MORE operation manual) and M's behaviours such as removing diaper, tying on bib, etc. will not be recorded, but other affectionate or additional physical contacts with the I will be noted using this code. M's physical guidance of I through a task is not included (code 34).

Examples: M picks up, soothes, rocks, strokes, holds, cuddles, hugs, kisses I.

22 Expressive gesture positive

This category includes M's non-verbal behaviours which are directed to the I. but which do not involve physical contact (code 21), M's presentation of materials to I. (code 27), or M's physical guidance of the I. through a task (code 34).

The non-verbal or gestural behaviours of M which are included involve M's attention or direction of I's attention, M's receipt of an object from I., and M's response to the I's direction of her attention. As described under code 02, this code will be used for M's joint reference with I. Also included in this category is M's participation in interactive games which involve body movement, e.g. pat-a-cake, clapping games, action songs, and finger plays. It is anticipated that these M behaviours will generally be simultaneous with verbal behaviours; these will be recorded separately. M's non-verbal restrictive or punitive behaviours are included in code 23.

Examples: M points, M waves; M receives/takes from I; M looks at something in response to I's initiation; M plays movement games with I.

23 Expressive gesture negative

Behaviours coded under this category include M's restriction or interruption of I's behaviour through physical means. M's intention is obviously to end I behaviour in an immediate and definite manner through her gesture or action. Physical punishment is included.

Examples: M picks up or moves I in order to restrict or stop; M removes; M takes away objects to end I activity; M slaps, hits I; M ignores, resists I as means of ending behaviour.

24 Smiles

All M smiles or laughter directed toward I. Smiles will not be coded as imitative unless an imitative sequence is readily observable. Smiles at others are not included.

Examples: M laughs, smiles at or with I.

25 Looks

This category includes all M looks, glances, or gazes at I. Looks at others or at objects are not included. Eye contact does not have to be established, nor is the duration of the look or glance a criterion for recording.

Examples: M looks at, glances at, gazes at I; M establishes eye contact with I; M. looks at I during an activity; M looks or checks to see where I is; M catches I's eye.

26 Imitates

This code is used for any M behaviour which is an immediate and obvious imitation of any verbal or non-verbal behaviour. M's imitation must be exact: expansions or elaborations of I's behaviour are coded separately (verbal expansion—code 32; non-verbal elaboration—code 22). Expansion or elaboration of I behaviour is however distinct from M

behaviours which occur simultaneously with imitation. For example, I claps hands (02); M claps hands (imitates 26) and verbalizes (30).

27 Stimulation with materials

M behaviours which involve the presentation of materials to the I or activity with materials with the I are included in this category. M may give materials, objects or toys to the I, model their use or an activity with them, or play with I around them. Physical guidance (code 34) is not included. Verbal instructions (code 33) or labelling (code 31) are recorded separately.

This code records M-initiated activity or stimulation with materials primarily. M's response to I-initiated activity with maaterials will be coded separately using codes 22 (e.g. M takes toy I offers). Subsequent interactive play will then be recorded as code 27.

Examples: M brings, gives, presents an object or toy to I; M shows how or models play; M plays with I.

28 Reinforcement

This code records M's verbal praise of the I. The I's name may be paired with the words of praise and will not be recorded separately.

Examples: "good boy", "that's right", "well done".

29 Verbal negative

M's verbal reprimands, rebukes, or verbal expressions of disapproval of the I or the I's behaviour are included in this category.

Example: "no", "don't do that", "stop right now", "bad boy", "I don't like that.

30 Verbal stimulation

This code will be used for the majority of I-directed M verbalizations. Specific M verbal behaviours which are recorded separately are those which are contingent responses to I behaviour by verbal praise or punishment (codes 28 and 29 respectively) and those which are definite teaching behaviours (code 31—labels; code 32—expansion; code 33—instructions). The latter group of M verbal behaviours have been selected for separate coding in particular because of their relationship to the objectives of the early intervention programs.

Verbalizations to be coded within this category include the broad range from M's verbal stimulation through songs, rhymes, nonsense syllables etc. Questions, comments, responses to I's expressions are also included.

Example: "you are a happy baby, aren't you?" "Yes, we're going to put that over there now." "Are you hungry now—is that it?" "you really like those things to play with, don't you?"

31 Labels

M emphasizes, in a teaching manner, the name of an object or person for the I. M's labelling must be an obvious attempt to convey a new piece of information to the I. Her intonation and the form of her phrase or sentence will be the criteria for the use of this code.

Examples: "This is a dog." "That is a book, book"; "There is a bird."

Examples of verbalizations which are not coded as labelling: "Now, here is your dinner" "Look! I've brought you a toy."

32 Expands

M responds to an I vocalization by clarifying, expanding, or elaborating the vocalization without changing the meaning.

Example: I: "pat-a, pat-a — M: "pat-cake, pat-a-cake"
I: "truck — M: "yes, it's a truck and it goes vroom!"

33 Gives intructions

M's verbalizations which are instructions or directions for the I are included in this category. This code differs from 30—verbal stimulation—in that it is readily observable the M expects a verbal or non-verbal response from the I. Step by step verbal guidance of the I through an activity is included. Reprimands or instructions to stop an activity are coded separately using code 29.

Examples: "Look over there"; "Bring your puzzle to me"; "put this one in now"; "show me your hand"; "tell me what this is".

34 Physical guidance

This code is used for M's physical prompting or guidance of the I through a task by physical means or by "putting through". This type of physical contact is different from that of code 21 as it is primarily instructional or helping rather than affectionate in nature.

Example: M takes I's hand and assists I in picking up or manipulating an object; M guides I's arms, legs, or body during an activity or task.

DATA MORE OPERATION MANUAL

Procedures for the use of the DATA MORE

Procedures and basic steps for operations involved in the use of the MORE may be broken down in the following manner:

- entering observational data into the MORE
- transferring data from the MORE to a cassette tape for storage
- verifying the data transfer
- loading data stored on a cassette tape back to the MORE, and
- dumping data from the MORE to a host computer for analysis.

Each of these basic procedures has been developed into specific step-by-step operations. The following sections present these operations in a manual format.

STEP 1: ENTERING OBSERVATIONAL DATA INTO THE DATA MORE

MORE's Response	Operation by user
	Power on
	Red button down
	Press *RESET
	Press CLEAR
	Red button UP (release RED)
MORE ID #	Press CODE
CSCS	EC 'ADV' (Press ERROR and then CODE to obtain EC and then press ADV). EC activates the Elapsed Clock Mode
CLCL	02 'ADV' (Code Length = 2 digits)
SCSC	02 'ADV' (Session Clock = 2minutes)
0000	Observer's identification code (2 digits)
...A	Date of observation (2 digits for each of M, D, and Y) 'ADV'
...A	Subject ID # (3 digits) 'ADV'
...A	[1]Observation number (2 digits) 'ADV'
...A	[2]Observation situation number (2 digits) 'ADV'
...A	[3]Trial number (2 digits) 'ADV'
	Press DATA
	This last operation clears both left and right displays leaving only the two dots that separate the left from the right display. The MORE is ready to receive data.
	When you are ready to start your first 2-minute session, type in 00 to set the session clock running. The second by second count of the session clock occurs on the right display.
	After typing in 00, record behaviours as you observe them. Remember each behaviour code is a 2-digit number.

[1] Note that parent-child observations (PCOs) are 8 weeks apart. Each observation is numbered.

[2] PCOs are to be done under 3 situations: 01—Structured; 02—Unstructured (Free Play); and 03—Mother-child separation.

[3]Every 2-minute session is called a trial. Thus in an 01 observation situation, trials 01 to 05 exist, while trials go from 01 to 15 in a free play or unstructured situation.

WHEN A MISTAKE OCCURS

The ERROR button is your tool for correcting errors entered into the MORE. On discovering that you have entered the wrong behaviour code, press ERROR immediately and enter the right code. This operation wipes away your wrong entry and replaces it with the new entry.

MISSING A FIRST DIGIT

A serious error entry that may occur is missing the first digit of a behaviour code entry. For example, in entering behaviour 08 you may not have pressed 0 hard enough for it to be recorded. When this happens only the 8 will appear on the left display. When you discover this error entry, press ERROR and enter 08 again. Note that if this error entry passes undetected all entries made after it will be wrong. Assume that this error went unnoticed and you entered the following behaviours subsequently: 28 05 25 02 22. Your ODIN print-out will show the following: 82 80 52 50 22 2. Avoid this by (a) pressing button hard enough, and (b) glancing quickly at the left display after every entry. Of course pressing hard enough should be your option because you want to observe mother-child interaction and not your own equipment!

A less serious error is missing the second digit of a behaviour code entry. Like the last problem, all subsequent entries will be messed up if this error passed undetected. But when you notice it, you do not need to press ERROR; just add on the second digit.

THE END OF A 2-MINUTE SESSION

At the end of the trial, the session clock flashes two dots on the left display. Press FINISH to end the trial. Find out if a latch switch is still on; any latch switch that was turned on within the trial must be turned off at the end of the trial.

STARTING A NEW 2-MINUTE TRIAL

After pressing FINISH to end one trial, enter the new trial number followed by ADV. Now press DATA to begin the new trial (the rest of the header will be pushed down automatically by ODIN). Whenever DATA is pressed both displays should go blank. If you press DATA and EEEE appears on the left display it may be an indication that a latch switch has been left on from the last trial. Turn it off and the displays will go blank. You are set to enter data. Enter 00 to start the session clock and proceed with data entry.

STARTING A NEW OBSERVATION SITUATION

If you are moving from one observation situation to another, say from FEEDING (01) to FREE PLAY (02), you need not retype all information on the header. Just type in the new observation situation code, press ADV, follow it with the trial number (which should be 01) and press ADV. Press DATA and start recording as usual.

STEP 2: TRANSFERRING DATA FROM THE DATA MORE TO CASSETTE

It is important to remember that the data you collect are available on the MORE only for as long as the power continues to be on. As soon as the power goes off the entire data will be lost. To prevent data loss through power cut-off or as a result of running out of memory (remember the MORE holds 9999 characters of entry), you are advised to transfer your data on to a cassette tape after observing each dyad.

Follow the following steps to complete a transfer of data from MORE to cassette:

- Connect MORE's and output ports to the cassette recorder's input port (red pins)
- Push red button down
- Press DUMP

  MORE will respond with 'bdbd' on the left display.

- Respond to 'bdbd' with 02 ADV (02 activates a baud rate of 1800)
  MORE indicates '0d0d' on the left display.
- Respond to '0d0d' with 01 ADV (to indicate that the data transfer is to a cassette)
  MORE requests for File ID with a 'CFCF' response.
- Respond to CFCF with a 2-digit ID (Do not press ADV yet).
- Place the cassette recorder in record mode. Let recorder get up to speed.
- Press ADV on MORE
  MORE responds with 'dddd' to signify end of dump.

STEP 3: VERIFYING YOUR DATA TRANSFER

When you have finished the transfer procedure, you will want to be sure that the transfer has been done and that the data on the cassette tape can be retrieved any time you want to. The procedure for verifying the correctness of your transfer is outlined below. It is a simple one!

- Connect the cassette recorder's output port to MORE's input port (black pins).
- Rewind tape to the point where your data (file) starts (tape counter helps you to determine the start and end of file).
- Push down the Red Button on MORE.
- Press ADV.
- Start the cassette (i.e. put it in play mode). If MORE responds with 'dddd' say Bingo!. The dump was a success. if 'dddd' does not appear try the dump again.

STEP 4: LOADING DATA FROM CASSETTE TO MORE

The analysis of your data is done by a host computer to which the MORE is connected. Thus just before data analysis by ODIN and the subsequent programs in the ODAP package your data must move from the cassette tape to the MORE again. The following are the steps you will go through to successfully load your data from the cassettre tape to the MORE:

- Connect MORE's input port to the recorders output port (black pins).
- Push down the Red button.
- Press RESET.
- Press CLEAR.
- RED up (release red button).
- Push down the RED Button again.
- Press YELLOW (CTRL) button.
- Press LOAD. MORE displays 'CFCF' on left display.
- Respond to 'CFCF' by entering the ID of the file to be loaded.
- Press ADV.
- Turn volume and Tone controls of cassette all the way up.
- Put cassette in play mode.
  If MORE responds with 'dddd' on the left display and the ID number supplied on the right display loading has been successful.

STEP 5: DUMPING DATA FROM MORE TO COMPUTER

Please see the MORE manual for details of this procedure.

APPENDIX B. SAMPLE COMPUTER RECORD OF DYADIC INTERACTION

SAMPLE OUTPUT FROM PROGRAMS "ODIN" AND "ODALL"

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T	CS	CL	SC	OB	DATEOB	SUB	ON	OS	TR	HU	S	GR	AGEX
3	EC	02	02	50	122083	951	01	02	01	90	1	99	256
				0	4	0							
				30	1	4							
				30	3	5							
				25	3	8							
				1	4	11							
				25	1	15							
				8	6	16							
				30	3	22							
				34	2	25							
				30	0	27							
				33	1	27							
				34	1	28							
				28	7	29							
				30	1	36							
				5	2	37							
				30	1	39							
				5	2	40							
				30	6	42							
				30	1	48							
				27	1	49							
				2	0	50							
				30	2	50							
				30	6	52							
				30	5	58							
				30	14	63							
				30	1	77							
				24	1	78							
				30	11	79							
				5	1	90							
				30	1	91							
				21	5	92							
				30	2	97							
				30	2	99							
				21	3	101							
				30	1	104							
				4	2	105							
				21	6	107							
				30	3	113							
				21	1	116							
				4	0	117							
				30	4	117							
-1						121							
T	CS	CL	SC	OB	DATEOB	SUB	ON	OS	TR	HU	S	GR	AGEX
3	EC	02	02	50	122083	951	01	02	02	90	1	99	256
				0	2	0							
				8	0	2							
				30	2	2							
				30	3	4							
				30	4	7							
				30	1	11							
				27	1	12							
				30	3	13							
				30	4	16							
				8	1	20							
				30	3	21							
				22	1	24							
				2	1	25							
				30	1	26							

	24	3	27
	30	1	30
	4	1	31
	30	0	32
	4	6	32
	30	0	38
	22	1	38
	34	2	39
	30	0	41
	4	2	41
	30	2	43
	1	2	45
	30	1	47
	33	1	48
	34	7	49
	2	1	56
	23	1	57
	30	6	58
	30	6	64
	30	5	70
	30	19	75
	8	1	94
	26	2	95
	30	7	97
	30	3	104
	30	3	107
	30	4	110
	30	7	114
-1			121

T	CS	CL	SC	OB	DATEOB	SUB	ON	OS	TR	HU	S	GR	AGEX
3	EC	02	02	50	122083	951	01	02	03	90	1	99	256

	0	3	0
	30	5	3
	30	0	8
	25	1	8
	4	3	9
	30	4	12
	30	11	16
	25	1	27
	30	1	28
	8	1	29
	30	2	30
	2	1	32
	23	1	33
	30	2	34
	4	5	36
	30	2	41
	30	1	43
	8	1	44
	2	0	45
	33	2	45
	33	2	47
	34	1	49
	28	2	50
	28	0	52
	33	2	52
	33	3	54
	33	1	57
	34	1	58
	28	1	59

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```
          24    1     60
          28    3     61
           4    2     64
          30    8     66
          30    6     74
           8    2     80
          30    1     82
           8    3     83
          25    1     86
          30    3     87
           8    3     90
          33    0     93
          34    2     93
          27    6     95
           6    1    101
          30    1    102
          31    1    103
          22   10    104
          27    7    114
-1                    121
T CS CL SC OB DATEOB SUB ON OS TR HU S GR  AGEX
3 EC 02 02 50 122083 951 01 02 04 90 1 99   256
           0    2      0
          30    6      2
          30    2      8
          25    9     10
          30    1     19
          30    1     20
           8   15     21
          24    3     36
           8    2     39
           2   13     41
          30    0     54
          24   14     54
          30    9     68
           5    3     77
           8    1     80
          26    0     81
          30    1     81
          30    3     82
          30   12     85
           8    4     97
          30    2    101
           5    1    103
          25    1    104
          30    0    105
           8    1    105
          30    3    106
          30    3    109
          30    3    112
           8    2    115
           8    1    117
           8    1    118
          26    1    119
-1                    120
T CS CL SC OB DATEOB SUB ON OS TR HU S GR  AGEX
3 EC 02 02 50 122083 951 01 02 05 90 1 99   256
           0    2      0
          30    2      2
          21   11      4
```

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8	7	15
8	2	22
30	1	24
30	7	25
22	1	32
6	1	33
28	2	34
30	0	36
28	2	36
8	0	38
4	12	38
30	3	50
25	1	53
30	2	54
23	4	56
30	3	60
25	1	63
30	3	64
30	15	67
30	2	82
30	3	84
24	1	87
30	5	88
8	1	93
8	5	94
27	4	99
27	3	103
24	0	106
5	11	106
27	2	117
30	1	119
-1		120

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TRIAL-BY-TRIAL SUMMARY

H
T CS CL SC OB DATEOB SUB ON OS TR HU S GR AGEX
3 EC 02 02 50 122083 951 01 02 01 90 1 99 256

	CODE ALL	FREQ	DUR	MDUR	SD-D	PF	PD
D							
	0	1.	4.	4.00	0.0	0.024	0.033
	1	1.	4.	4.00	0.0	0.024	0.033
	2	1.	0.	0.0	0.0	0.024	0.0
	4	2.	2.	1.00	1.41	0.049	0.017
	5	3.	5.	1.67	0.58	0.073	0.041
	8	1.	6.	6.00	0.0	0.024	0.050
	21	4.	15.	3.75	2.22	0.098	0.124
	24	1.	1.	1.00	0.0	0.024	0.008
	25	2.	4.	2.00	1.41	0.049	0.033
	27	1.	1.	1.00	0.0	0.024	0.008
	28	1.	7.	7.00	0.0	0.024	0.058
	30	20.	68.	3.40	3.59	0.488	0.562
	33	1.	1.	1.00	0.0	0.024	0.008
	34	2.	3.	1.50	0.71	0.049	0.025
T							
	TOTAL	41.	121.				

H
T CS CL SC OB DATEOB SUB ON OS TR HU S GR AGEX
3 EC 02 02 50 122083 951 01 02 02 90 1 99 256

	CODE ALL	FREQ	DUR	MDUR	SD-D	PF	PD
D							
	0	1.	2.	2.00	0.0	0.024	0.017
	1	1.	2.	2.00	0.0	0.024	0.017
	2	2.	2.	1.00	0.0	0.048	0.017
	4	3.	9.	3.00	2.65	0.071	0.074
	8	3.	2.	0.67	0.58	0.071	0.017
	22	2.	2.	1.00	0.0	0.048	0.017
	23	1.	1.	1.00	0.0	0.024	0.008
	24	1.	3.	3.00	0.0	0.024	0.025
	26	1.	2.	2.00	0.0	0.024	0.017
	27	1.	1.	1.00	0.0	0.024	0.008
	30	23.	85.	3.70	3.97	0.548	0.702
	33	1.	1.	1.00	0.0	0.024	0.008
	34	2.	9.	4.50	3.54	0.048	0.074
T							
	TOTAL	42.	121.				

H
T CS CL SC OB DATEOB SUB ON OS TR HU S GR AGEX
3 EC 02 02 50 122083 951 01 02 03 90 1 99 256

	CODE ALL	FREQ	DUR	MDUR	SD-D	PF	PD
D							
	0	1.	3.	3.00	0.0	0.021	0.025
	2	2.	1.	0.50	0.71	0.042	0.008
	4	3.	10.	3.33	1.53	0.063	0.083
	6	1.	1.	1.00	0.0	0.021	0.008

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	8	5.	10.	2.00	1.00	0.104	0.083
	22	1.	10.	10.00	0.0	0.021	0.083
	23	1.	1.	1.00	0.0	0.021	0.008
	24	1.	1.	1.00	0.0	0.021	0.008
	25	3.	3.	1.00	0.0	0.063	0.025
	27	2.	13.	6.50	0.71	0.042	0.107
	28	4.	6.	1.50	1.29	0.083	0.050
	30	14.	47.	3.36	3.15	0.292	0.388
	31	1.	1.	1.00	0.0	0.021	0.008
	33	6.	10.	1.67	1.03	0.125	0.083
	34	3.	4.	1.33	0.58	0.063	0.033
T							
	TOTAL	48.	121.				

H

T	CS	CL	SC	OB	DATEOB	SUB	ON	OS	TR	HU	S	GR	AGEX
3	EC	02	02	50	122083	951	01	02	04	90	1	99	256

	CODE ALL	FREQ	DUR	MDUR	SD-D	PF	PD
D							
	0	1.	2.	2.00	0.0	0.031	0.017
	2	1.	13.	13.00	0.0	0.031	0.108
	5	2.	4.	2.00	1.41	0.063	0.033
	8	8.	27.	3.38	4.81	0.250	0.225
	24	2.	17.	8.50	7.78	0.063	0.142
	25	2.	10.	5.00	5.66	0.063	0.083
	26	2.	1.	0.50	0.71	0.063	0.008
	30	14.	46.	3.29	3.47	0.438	0.383
T							
	TOTAL	32.	120.				

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H

T	CS	CL	SC	OB	DATEOB	SUB	ON	OS	TR	HU	S	GR	AGEX
3	EC	02	02	50	122083	951	01	02	05	90	1	99	256

	CODE ALL	FREQ	DUR	MDUR	SD-D	PF	PD
D							
	0	1.	2.	2.00	0.0	0.029	0.017
	4	1.	12.	12.00	0.0	0.029	0.100
	5	1.	11.	11.00	0.0	0.029	0.092
	6	1.	1.	1.00	0.0	0.029	0.008
	8	5.	15.	3.00	2.92	0.147	0.125
	21	1.	11.	11.00	0.0	0.029	0.092
	22	1.	1.	1.00	0.0	0.029	0.008
	23	1.	4.	4.00	0.0	0.029	0.033
	24	2.	1.	0.50	0.71	0.059	0.008
	25	2.	2.	1.00	0.0	0.059	0.017
	27	3.	9.	3.00	1.00	0.088	0.075
	28	2.	4.	2.00	0.0	0.059	0.033
	30	13.	47.	3.62	3.86	0.382	0.392
T							
	TOTAL	34.	120.				

COMBINED-TRIALS SUMMARY

H T	CS	CL	SC	OB	DATEOB	SUB	ON	OS	TR	HU	S	GR	AGEX
3	EC	02	02	50	122083	951	01	02	01	90	1	99	256
3	EC	02	02	50	122083	951	01	02	02	90	1	99	256
3	EC	02	02	50	122083	951	01	02	03	90	1	99	256
3	EC	02	02	50	122083	951	01	02	04	90	1	99	256
3	EC	02	02	50	122083	951	01	02	05	90	1	99	256

D	CODE ALL	FREQ	DUR	MDUR	SD-D	PF	PD
	0	5.	13.	2.60	0.89	0.025	0.022
	1	2.	6.	3.00	1.41	0.010	0.010
	2	6.	16.	2.67	5.09	0.030	0.027
	4	9.	33.	3.67	3.64	0.046	0.055
	5	6.	20.	3.33	3.83	0.030	0.033
	6	2.	2.	1.00	0.0	0.010	0.003
	8	22.	60.	2.73	3.31	0.112	0.100
	21	5.	26.	5.20	3.77	0.025	0.043
	22	4.	13.	3.25	4.50	0.020	0.022
	23	3.	6.	2.00	1.73	0.015	0.010
	24	7.	23.	3.29	4.86	0.036	0.038
	25	9.	19.	2.11	2.67	0.046	0.032
	26	3.	3.	1.00	1.00	0.015	0.005
	27	7.	24.	3.43	2.37	0.036	0.040
	28	7.	17.	2.43	2.23	0.036	0.028
	30	84.	293.	3.49	3.57	0.426	0.486
	31	1.	1.	1.00	0.0	0.005	0.002
	33	8.	12.	1.50	0.93	0.041	0.020
	34	7.	16.	2.29	2.14	0.036	0.027
T	TOTAL	197.	603.				

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APPENDIX C. PARENT-CHILD INTERACTION DATA

KEY TO ABBREVIATIONS USED IN APPENDIX 3

SUB—Subject/family identification number
IPCO—Physical contact: Infant
IEPO—Positive expressive gesture: Infant
IENE—Negative expressive gesture: Infant
ISMI—Smile: Infant
ILKS—Look: Infant
IMIT—Imitate: Infant
IVPO—Positive vocalization: Infant
IVNE—Negative vocalization: Infant
AGDES—Aggressive-destructive behaviour: Infant
VCOM—Compliance with verbal instruction: Infant

MPCO—Physical contact: Mother
MEPO—Positive expressive gesture: Mother
MENE—Negative expressive gesture: Mother
MSMI—Smile: Mother
MLKS—Look: Mother
MIMI—Imitate: Mother
STIP—Stimulation of play: Mother
VRFT—Verbal reinforcement: Mother
MVNE—Negative verbalization: Mother
VSTM—Verbal stimulation: Mother
LABL—Label: Mother
EXPD—Expand: Mother
INST—Instruct: Mother
PGUI—Physical guidance: Mother.

STATISTICAL ABBREVIATIONS

Md—Median of distribution
Ql—Lower quartile (Q_1) of distribution
Qu—Upper quartile (Q_3) of distribution
dq—Difference between quartiles (Q_3-Q_1)
Xl—Lowest score in distribution
Xu—Highest score in distribution

** All extreme scores are underlined

** Frequency data are reported as % of total behaviours observed.

** Sequential dependency data are reported as *z-scores*.

CHILD BEHAVIOURS—NONINTERVENTION GROUP (ASSESSMENT 1)

SUB	IPCO	IEPO	IENE	ISMI	ILKS	IMIT	IVPO	IVNE	AGDES	VCOM
111	0.6	1.9	1.6	1.3	3.2	0.0	12.6	2.3	0.3	0.0
151	2.0	1.3	0.0	3.1	13.2	0.0	12.0	0.2	0.2	0.7
202	0.7	3.2	1.1	3.5	10.3	1.2	8.5	0.4	0.5	3.5
221	2.6	2.0	0.0	5.9	4.3	0.0	8.5	0.3	0.0	2.6
231	0.0	1.9	0.5	5.3	5.7	1.1	15.2	0.3	0.0	0.0
241	0.7	3.2	1.1	3.5	10.3	1.2	8.5	0.4	0.5	3.5
251	0.2	5.7	1.3	0.9	9.5	1.3	8.9	0.0	0.0	1.7
261	0.6	6.1	0.0	5.2	12.5	0.3	10.3	0.3	0.0	0.0
281	2.6	2.0	0.0	5.9	4.3	0.0	8.5	0.3	0.0	2.6
Md	0.68	2.03	0.50	3.53	9.50	0.30	8.90	0.31	0.04	1.70
Ql	0.56	1.91	0.01	3.08	4.39	0.01	8.53	0.26	-0.01	0.18
Qu	2.02	3.24	1.17	5.33	10.56	1.19	12.10	0.39	0.33	2.86
dq	1.46	1.32	1.16	2.25	6.17	1.18	3.57	0.13	0.33	2.68
Xl	0.00	1.30	0.00	0.90	3.20	0.00	8.50	0.00	0.00	0.00
Xu	2.60	6.10	1.60	5.90	12.50	1.30	15.20	2.30	0.50	3.50

CHILD BEHAVIOURS—SHORT INTERVENTION GROUP (ASSESSMENT 1)

SUB	IPCO	IEPO	IENE	ISMI	ILKS	IMIT	IVPO	IVNE	AGDES	VCOM
321	0.0	0.9	0.0	4.0	7.7	0.0	5.6	1.2	0.0	0.0
381	1.2	2.7	1.2	1.5	6.0	1.7	2.2	1.5	0.0	3.7
361	0.0	9.8	0.2	9.0	6.3	3.1	4.3	0.0	0.0	0.8
421	0.0	1.9	0.3	0.5	7.3	0.0	6.8	3.5	0.0	0.3
601	2.4	4.2	0.0	1.8	6.7	0.0	10.2	1.0	0.0	1.1
621	1.1	2.4	0.1	2.5	16.1	0.5	11.2	0.0	0.0	3.1
631	5.4	0.2	0.6	1.6	6.4	0.0	17.8	3.2	0.2	2.4
642	0.9	6.5	0.6	1.1	8.4	0.1	18.4	0.0	0.0	2.7
651	0.4	0.2	0.4	1.0	5.9	0.0	4.7	5.3	0.0	9.1
Md	0.90	2.40	0.30	1.60	6.70	0.04	6.80	1.20	0.01	2.40
Ql	0.03	0.82	0.08	1.08	6.28	-0.01	4.60	0.05	-0.04	0.73
Qu	1.22	4.27	0.59	2.53	7.72	0.53	11.30	3.25	0.07	3.17
dq	1.20	3.45	0.51	1.45	1.45	0.53	6.70	3.20	0.11	2.44
Xl	0.00	0.20	0.00	0.50	5.90	0.00	2.20	0.00	0.00	0.00
Xu	5.40	9.80	1.20	9.00	16.10	3.10	18.40	5.30	0.20	9.10

CHILD BEHAVIOURS—LONG INTERVENTION GROUP (ASSESSMENT 1)

SUB	IPCO	IEPO	IENE	ISMI	ILKS	IMIT	IVPO	IVNE	AGDES	VCOM
341	1.0	5.5	0.5	1.0	7.0	0.3	12.0	1.6	0.0	1.0
371	0.8	3.8	1.3	3.6	6.2	1.5	19.0	0.0	0.0	1.0
401	0.0	1.1	0.2	5.9	9.4	0.4	2.5	4.8	0.0	0.6
501	1.2	1.6	0.0	1.2	6.8	0.2	25.0	1.2	0.0	1.8
511	1.9	4.6	0.6	4.8	7.4	1.7	15.6	0.0	0.2	1.1
521	1.7	2.1	0.5	1.4	4.3	0.5	12.5	0.5	0.2	2.9
531	1.3	1.6	0.5	0.4	5.1	0.0	1.2	0.0	0.0	2.7
711	3.4	3.2	0.0	4.9	4.2	0.0	14.8	0.0	0.0	3.5
721	0.0	4.7	0.4	0.2	10.8	0.0	24.3	1.7	0.0	3.4
Md	1.20	3.20	0.47	1.40	6.80	0.30	14.80	0.50	0.03	1.80
Ql	0.78	1.61	0.18	0.98	5.08	0.03	11.88	0.01	-0.04	1.01
Qu	1.72	4.62	0.54	4.82	7.42	0.53	19.13	1.62	0.09	2.92
dq	0.94	3.01	0.36	3.84	2.34	0.50	7.25	1.61	0.12	1.91
Xl	0.00	1.10	0.00	0.20	4.20	0.00	1.20	0.00	0.00	0.60
Xu	3.40	5.50	1.30	5.90	10.80	1.70	25.00	4.80	0.20	3.50

CHILD BEHAVIOURS—NONHANDICAPPED M.A. COMPARISON GROUP (ASSESSMENT 1)

SUB	IPCO	IEPO	IENE	ISMI	ILKS	IMIT	IVPO	IVNE	AGDES	VCOM
901	0.7	3.0	0.7	4.8	6.5	0.7	9.6	1.0	0.0	0.8
911	1.0	5.4	0.5	3.7	5.8	0.4	11.1	0.1	0.0	1.2
921	0.2	8.3	1.2	2.6	4.5	0.3	10.3	2.1	0.0	0.5
931	1.1	6.6	0.2	3.4	6.6	0.0	8.1	2.5	0.0	0.7
941	2.0	2.7	0.0	5.8	6.3	0.0	11.3	0.2	0.0	0.0
951	1.5	4.9	0.0	3.0	4.4	0.5	17.9	0.0	0.0	0.0
961	1.7	7.6	0.0	1.1	2.6	0.0	13.7	1.2	0.0	0.0
971	0.0	6.6	0.2	2.6	6.8	0.2	27.7	0.7	0.2	0.7
981	0.0	6.7	0.2	7.3	6.0	0.3	12.4	0.9	0.0	1.2
Md	1.00	6.58	0.20	3.40	6.00	0.28	11.30	0.90	0.01	0.68
Ql	0.18	4.87	0.05	2.64	4.47	0.03	10.25	0.18	-0.04	0.03
Qu	1.53	6.73	0.55	4.87	6.53	0.43	13.75	1.22	0.07	0.83
dq	1.35	1.85	0.50	2.23	2.05	0.40	3.50	1.04	0.11	0.80
Xl	0.00	2.70	0.00	1.10	2.60	0.00	8.10	0.00	0.00	0.00
Xu	2.00	8.30	1.20	5.80	6.80	0.70	27.70	2.50	0.20	1.20

CHILD BEHAVIOURS—NONHANDICAPPED C.A. COMPARISON GROUP (ASSESSMENT 1)

SUB	IPCO	IEPO	IENE	ISMI	ILKS	IMIT	IVPO	IVNE	AGDES	VCOM
801	0.4	6.3	0.4	1.8	5.1	0.4	14.5	0.0	0.0	3.4
811	0.4	9.2	0.4	0.9	3.4	0.9	23.6	0.0	0.0	0.9
821	0.3	9.2	0.3	1.8	5.4	0.1	5.7	0.0	0.0	3.0
831	0.0	7.7	1.0	3.9	3.8	0.7	19.6	1.7	0.0	0.5
841	0.1	7.0	0.0	4.5	8.6	0.1	15.7	0.1	0.0	2.2
851	0.8	5.9	0.0	5.2	6.6	2.4	16.4	0.3	0.0	0.3
861	0.1	8.5	0.1	1.3	3.1	3.3	22.6	0.7	0.0	1.4
871	0.2	7.9	0.2	2.5	4.8	0.6	22.5	0.0	0.0	0.8
881	0.4	6.6	0.4	4.4	6.1	0.7	8.2	0.0	0.0	0.9
Md	0.30	7.70	0.30	2.50	5.10	0.68	16.40	0.04	0.00	0.93
Ql	0.11	6.55	0.08	1.76	3.73	0.38	14.47	-0.01	0.00	0.78
Qu	0.41	8.55	0.41	4.24	6.18	0.93	22.52	0.33	0.00	2.22
dq	0.29	2.00	0.33	2.66	2.44	0.55	8.04	0.33	0.00	1.44
Xl	0.00	5.90	0.00	0.99	3.10	0.10	5.70	0.00	0.00	0.30
Xu	0.80	9.20	1.00	5.20	8.60	3.30	23.60	1.70	0.00	3.40

MATERNAL BEHAVIOURS—NONINTERVENTION GROUP (ASSESSMENT 1)

SUB	MPCO	MEPO	MENE	MSMI	MLKS	MIMI	STIP	VRFT	MVNE	VSTM	LABL	EXPD	INST	PGUI
111	1.3	0.6	1.6	0.0	16.1	0.0	8.1	2.9	1.3	28.7	1.0	0.3	11.9	2.3
151	12.1	0.7	0.4	1.3	15.2	0.4	4.9	0.4	0.0	27.5	2.0	0.0	2.0	0.5
202	1.6	2.8	0.2	2.0	6.2	1.6	3.5	2.0	1.2	28.7	3.4	0.2	13.3	0.4
221	5.9	0.7	0.3	2.0	10.2	1.3	3.0	1.0	0.0	38.4	3.6	0.0	4.6	3.0
231	4.8	1.9	0.9	1.9	10.8	2.9	4.6	1.4	0.3	31.4	0.3	0.3	7.6	0.9
241	1.6	2.8	0.2	2.0	6.2	1.6	3.5	2.0	1.2	28.7	3.4	0.2	13.3	0.4
251	1.5	4.7	0.2	1.9	7.4	2.7	5.5	4.2	0.2	25.0	3.6	0.4	10.8	2.5
261	4.0	3.3	0.0	4.9	16.1	0.0	6.4	0.0	0.0	27.4	0.3	0.0	1.5	0.9
281	5.9	0.7	0.3	2.0	10.2	1.3	3.0	1.0	0.0	38.4	3.6	0.0	4.6	3.0
Md	4.00	1.90	0.28	1.96	10.35	1.35	4.60	1.40	0.20	28.70	3.35	0.18	7.60	0.93
Ql	1.56	0.69	0.19	1.86	7.25	0.35	3.39	0.85	0.01	27.47	0.95	0.01	4.41	0.48
Qu	5.89	2.84	0.43	2.02	15.35	1.67	5.58	2.15	1.19	31.42	3.55	0.29	12.03	2.52
dq	4.32	2.14	0.23	0.16	8.10	1.32	2.18	1.30	1.18	3.95	2.60	0.28	7.62	2.04
Xl	1.30	0.60	0.00	0.00	6.20	0.00	3.00	0.00	0.00	27.40	0.30	0.00	1.50	0.40
Xu	12.10	4.70	1.60	4.90	16.10	2.90	8.10	4.20	1.30	38.40	3.60	0.40	13.30	3.00

MATERNAL BEHAVIOURS—SHORT INTERVENTION GROUP (ASSESSMENT 1)

SUB	MPCO	MEPO	MENE	MSMI	MLKS	MIMI	STIP	VRFT	MVNE	VSTM	LABL	EXPD	INST	PGUI
321	11.7	0.0	0.0	3.7	9.3	1.5	5.9	0.6	0.0	38.0	0.9	0.0	7.4	1.5
381	0.2	3.0	0.2	2.0	9.7	0.7	5.5	3.7	0.0	32.8	1.7	0.0	16.9	1.7
361	1.8	7.7	0.0	5.5	6.9	1.2	8.8	2.2	0.4	21.2	1.0	0.0	7.9	2.0
421	7.9	1.1	0.0	4.1	9.0	1.1	3.3	2.2	0.3	34.8	0.5	0.0	10.3	5.9
601	8.1	3.9	0.2	2.6	9.1	1.8	5.5	0.3	0.0	27.5	6.8	0.0	6.5	0.0
621	7.2	1.5	0.0	1.2	16.9	5.3	1.9	2.0	0.1	21.9	0.7	0.0	4.3	0.3
631	9.0	1.0	0.4	0.8	10.4	1.6	1.6	4.0	0.2	20.5	2.2	0.0	8.6	1.6
642	1.4	6.0	0.0	1.0	12.9	0.4	6.4	1.0	0.3	19.3	4.1	2.0	5.7	0.9
651	11.4	0.2	0.2	0.6	9.5	0.2	2.0	8.7	0.2	20.3	2.6	0.2	16.6	0.2
Md	7.90	1.50	0.08	2.00	9.50	1.20	5.47	2.15	0.18	21.90	1.70	0.03	7.90	1.50
Ql	1.75	0.98	-0.01	0.95	9.08	0.68	1.97	0.95	0.03	20.45	0.88	-0.01	6.43	0.28
Qu	9.05	3.92	0.22	3.75	10.42	1.62	5.92	3.75	0.29	32.85	2.62	0.09	10.37	1.72
dq	7.30	2.95	0.22	2.80	1.34	0.94	3.95	2.80	0.26	12.40	1.74	0.12	3.94	1.44
Xl	0.20	0.00	0.00	0.60	6.90	0.20	1.60	0.60	0.00	19.30	0.50	0.00	4.30	0.00
Xu	11.70	7.70	0.40	5.50	16.90	5.30	8.80	8.70	0.40	38.00	6.80	2.00	16.90	5.90

MATERNAL BEHAVIOURS—LONG INTERVENTION GROUP (ASSESSMENT 1)

SUB	MPCO	MEPO	MENE	MSMI	MLKS	MIMI	STIP	VRFT	MVNE	VSTM	LABL	EXPD	INST	PGUI
341	6.3	3.4	0.0	1.0	9.1	2.1	3.9	1.8	1.3	26.8	4.2	0.0	6.3	3.9
371	1.3	4.4	0.5	3.1	13.1	1.5	5.6	4.4	0.0	21.8	1.0	0.3	4.9	1.0
401	5.7	4.0	0.0	3.6	8.6	0.6	2.5	3.6	0.0	34.7	1.7	0.0	6.5	4.0
501	3.7	1.2	0.4	1.6	8.4	0.9	3.9	0.4	0.7	32.6	3.2	0.4	3.0	0.9
511	4.0	3.6	0.0	1.9	4.8	2.9	5.7	1.3	0.6	25.3	3.8	1.0	7.2	0.0
521	7.6	4.0	0.7	1.2	6.8	0.9	4.2	1.6	0.0	35.7	1.9	0.2	7.3	1.4
531	6.4	2.1	0.4	0.0	9.4	0.5	5.2	4.5	0.0	30.6	3.7	0.0	18.0	6.2
711	7.0	3.4	0.4	1.9	5.5	2.0	6.1	1.1	0.1	24.5	3.1	0.5	8.8	1.6
721	3.0	3.2	0.0	1.1	12.1	0.0	3.2	0.2	0.2	12.9	7.2	0.0	11.6	0.0
Md	5.70	3.45	0.37	1.60	8.60	0.93	4.20	1.60	0.10	26.80	3.20	0.20	7.20	1.40
Ql	3.67	3.15	0.01	1.08	6.75	0.58	3.86	1.08	0.01	24.30	1.87	0.01	6.28	0.88
Qu	6.42	3.97	0.44	1.94	9.45	2.02	5.62	3.63	0.63	32.80	3.82	0.43	8.83	3.92
dq	2.74	0.82	0.43	0.86	2.70	1.44	1.76	2.55	0.62	8.50	1.95	0.42	2.55	3.04
Xl	1.30	1.20	0.00	0.00	4.80	0.00	2.50	0.20	0.00	12.90	1.00	0.00	3.00	0.00
Xu	7.60	4.40	0.50	3.60	13.10	2.90	6.10	4.50	1.30	35.70	7.20	1.00	18.00	6.20

MATERNAL BEHAVIOURS—NONHANDICAPPED M.A. COMPARISON GROUP (ASSESSMENT 1)

SUB	MPCO	MEPO	MENE	MSMI	MLKS	MIMI	STIP	VRFT	MVNE	VSTM	LABL	EXPD	INST	PGUI
901	3.5	4.0	0.0	3.0	6.0	0.5	8.0	0.5	0.0	40.5	2.2	0.0	3.6	0.7
911	1.3	5.4	0.5	3.4	5.4	0.8	4.6	1.7	0.0	34.0	5.5	0.5	6.2	2.0
921	1.2	5.9	0.5	1.0	3.7	1.0	6.3	1.6	0.0	40.3	3.3	0.2	4.5	0.3
931	2.9	3.6	1.3	2.7	8.8	1.1	2.3	0.7	0.0	41.0	1.1	0.0	4.1	1.4
941	10.2	2.1	0.2	4.9	4.0	1.4	3.2	0.9	0.0	41.7	0.8	0.0	0.8	1.7
951	4.4	2.9	0.7	3.7	4.4	0.7	3.7	1.5	0.0	41.1	1.0	0.0	1.9	1.9
961	1.2	1.4	0.8	2.1	4.3	0.2	2.1	1.4	0.2	46.6	6.3	0.0	2.7	2.9
971	2.2	4.0	0.7	4.2	6.2	0.4	4.6	0.9	2.6	25.7	0.0	0.0	2.9	0.0
981	2.8	3.9	0.8	1.8	5.4	1.0	2.1	0.3	0.2	38.8	3.4	0.6	3.0	0.8
Md	2.80	3.90	0.68	3.00	5.37	0.80	3.70	0.93	0.05	40.50	2.20	0.03	3.00	1.40
Ql	1.28	2.87	0.46	2.03	4.28	0.48	2.25	0.68	-0.03	38.77	0.98	-0.01	2.67	0.68
Qu	3.52	4.04	0.79	3.77	6.02	1.04	4.67	1.52	0.18	41.12	3.42	0.23	4.13	1.92
dq	2.24	1.16	0.32	1.75	1.75	0.56	2.42	0.84	0.20	2.35	2.44	0.24	1.45	1.24
Xl	1.20	1.40	0.00	1.00	3.70	0.20	2.10	0.30	0.00	25.70	0.00	0.00	0.80	0.00
Xu	10.20	5.90	1.30	4.90	8.80	1.40	8.00	1.70	2.60	46.60	6.30	0.60	6.20	2.90

MATERNAL BEHAVIOURS—NONHANDICAPPED C.A. COMPARISON GROUP (ASSESSMENT 1)

SUB	MPCO	MEPO	MENE	MSMI	MLKS	MIMI	STIP	VRFT	MVNE	VSTM	LABL	EXPD	INST	PGUI
801	2.1	4.0	0.4	0.7	5.2	0.7	1.2	3.7	0.0	40.7	1.8	0.6	6.5	0.4
811	0.4	6.6	0.0	1.0	4.2	2.8	2.3	1.2	0.0	29.7	8.2	1.6	1.7	0.6
821	1.3	7.1	0.0	2.4	3.6	0.7	3.0	8.1	0.0	37.1	3.8	0.0	6.4	1.0
831	3.4	4.1	0.9	5.0	5.8	1.2	1.2	1.5	0.0	32.4	3.3	0.5	1.5	0.2
841	0.4	4.3	0.1	3.5	4.8	0.7	1.7	1.6	0.0	32.5	1.7	0.1	9.0	1.2
851	4.8	4.1	0.5	2.0	3.7	2.4	3.6	0.6	0.0	33.1	4.0	2.2	0.9	0.2
861	1.2	6.0	0.0	2.1	2.3	3.1	1.7	5.0	0.0	26.1	4.5	1.2	4.5	1.0
871	1.2	4.0	0.0	5.0	5.2	1.2	1.5	1.9	0.0	36.2	2.1	0.6	1.3	0.2
881	1.7	5.1	0.5	3.1	4.5	0.7	5.8	0.7	0.0	43.7	1.6	0.0	4.4	0.5
Md	1.30	4.30	0.10	2.40	4.50	1.12	1.75	1.60	0.00	33.10	3.30	0.58	4.40	0.50
Ql	1.16	4.06	0.01	1.97	3.67	0.72	1.45	1.17	0.00	32.37	1.78	0.08	1.47	0.23
Qu	2.13	6.03	0.49	3.53	5.19	2.47	3.05	3.72	0.00	37.13	4.02	1.22	6.42	0.99
dq	0.96	1.96	0.48	1.55	1.51	1.76	1.60	2.55	0.00	4.75	2.24	1.15	4.95	0.76
Xl	0.40	4.00	0.00	0.70	2.30	0.70	1.20	0.60	0.00	26.10	1.60	0.00	0.90	0.20
Xu	4.80	7.10	0.90	5.00	5.80	3.10	5.80	8.10	0.00	43.70	8.20	2.20	9.00	1.20

DEPENDENCY OF CHILD BEHAVIOUR UPON MATERNAL BEHAVIOUR—ASSESSMENT 1.

NONINTERVENTION MH GROUP

SUB	MPCO/ ISMI	MEPO/ IEPO	MSMI/ ISMI	MLKS/ ILKS	VSTM/ IVPO	INST/ VCOM
111	- 0.22	- 0.20	0.00	1.70	- 2.11	0.00
151	3.86	18.35	1.69	6.91	1.56	13.30
202	6.03	14.04	0.81	- 0.17	- 0.43	8.92
221	- 1.12	- 0.22	1.08	0.41	1.05	11.64
231	2.99	11.14	0.51	0.01	0.25	0.00
241	6.04	14.06	0.81	- 0.17	- 0.15	8.93
251	- 0.30	9.14	- 0.28	0.60	0.32	8.87
261	- 0.76	4.35	- 0.99	- 1.40	- 0.52	0.00
281	- 1.12	- 0.22	1.08	0.41	1.05	11.64
Md	- 0.22	9.14	0.74	0.37	0.25	8.92
Ql	- 0.76	- 0.21	- 0.07	- 0.15	- 0.45	0.00
Qu	3.86	14.04	1.05	0.65	1.04	11.64
dq	4.62	14.25	1.11	0.79	1.49	11.64
Xl	- 1.12	- 0.22	- 0.99	- 1.40	- 2.11	0.00
Xu	6.04	18.36	1.69	6.91	1.56	13.30

SHORT INTERVENTION MH GROUP

SUB	MPCO/ ISMI	MEPO/ IEPO	MSMI/ ISMI	MLKS/ ILKS	VSTM/ IVPO	INST/ VCOM
321	4.30	0.00	- 0.78	1.40	0.15	0.00
381	- 0.13	12.28	- 0.36	1.05	- 0.29	7.12
361	5.04	15.58	0.89	- 1.33	- 1.51	7.28
421	1.74	9.09	- 0.30	1.47	- 0.53	2.86
601	1.76	18.72	1.33	0.56	0.52	9.39
621	1.34	20.26	5.62	0.88	1.00	18.94
631	5.80	5.92	2.84	5.62	1.44	10.27
642	5.98	18.58	- 0.28	14.63	2.69	15.77
651	1.02	21.35	- 0.14	6.67	0.01	11.59
Md	1.76	15.58	- 0.14	1.40	0.15	9.39
Ql	1.34	9.06	- 0.31	0.86	- 0.33	7.08
Qu	5.05	18.75	1.33	5.64	1.03	11.63
dq	3.71	9.70	1.64	4.78	1.36	4.55
Xl	- 0.13	0.00	- 0.78	- 1.33	- 1.51	0.00
Xu	5.98	21.35	5.62	14.63	2.69	18.94

LONG INTERVENTION MH GROUP

SUB	MPCO/ ISMI	MEPO/ IEPO	MSMI/ ISMI	MLKS/ ILKS	VSTM/ IVPO	INST/ VCOM
341	1.55	5.80	- 0.19	1.78	0.76	6.68
371	- 0.44	9.33	- 0.56	2.10	- 0.47	8.81
401	0.39	8.55	- 1.07	1.13	0.23	6.58
501	- 0.44	- 0.33	2.88	- 0.57	2.11	16.30
511	3.73	9.07	- 0.77	0.09	0.36	9.45
521	0.29	15.56	- 0.32	5.43	1.61	10.58
531	3.51	18.68	0.00	14.55	1.15	7.73
711	3.78	20.33	1.04	9.55	2.62	14.17
721	- 0.18	8.33	- 0.11	5.73	1.57	8.98
Md	0.39	9.07	- 0.19	2.10	1.15	8.98
Ql	- 0.19	8.27	- 0.58	1.06	0.35	7.70
Qu	3.52	15.62	0.02	5.80	1.62	10.61
dq	3.71	7.34	0.60	4.74	1.27	2.90
Xl	- 0.44	- 0.33	- 1.07	- 0.57	- 0.47	6.58
Xu	3.78	20.33	2.88	14.55	2.62	16.30

NONHANDICAPPED M.A. COMPARISON GROUP

SUB	MPCO/ ISMI	MEPO/ IEPO	MSMI/ ISMI	MLKS/ ILKS	VSTM/ IVPO	INST/ VCOM
901	1.65	2.08	1.27	- 0.36	0.88	13.28
911	- 0.82	9.53	- 0.76	- 0.12	1.93	9.81
921	5.87	4.06	- 1.53	4.72	0.98	3.00
931	1.85	7.92	- 0.41	0.85	1.97	7.83
941	4.71	3.47	0.63	- 0.19	1.79	7.87
951	2.89	2.75	- 0.97	- 1.20	1.06	3.21
961	- 0.32	2.32	- 0.46	0.00	2.07	3.00
971	1.52	7.57	- 0.05	1.93	1.15	8.21
981	1.13	4.11	1.03	0.80	2.57	10.90
Md	1.65	4.06	- 0.41	0.00	1.79	7.87
Ql	1.10	2.74	- 0.77	- 0.20	1.05	3.20
Qu	2.92	7.58	0.64	0.86	1.98	9.82
dq	1.82	4.84	1.41	1.06	0.93	6.62
Xl	- 0.82	2.08	- 1.53	- 1.20	0.88	3.00
Xu	5.87	9.53	1.27	4.72	2.57	13.28

NONHANDICAPPED C.A. COMPARISON GROUP

801	1.07	4.66	- 0.36	- 0.42	2.54	15.93
811	2.12	2.23	2.42	- 0.26	3.10	11.36
821	2.27	5.34	3.21	1.09	0.55	12.86
831	- 0.44	2.10	1.36	0.44	3.08	11.46
841	5.33	- 0.39	- 0.27	0.05	3.55	16.64
851	0.62	1.74	- 1.01	0.25	0.81	9.80
861	- 0.47	1.26	- 0.61	2.69	1.04	14.19
871	14.39	5.93	1.11	0.42	2.45	17.99
881	2.41	2.62	- 0.52	1.66	3.49	15.13
Md	2.12	2.23	- 0.27	0.42	2.54	14.19
Ql	0.61	1.71	- 0.54	0.05	1.04	11.43
Qu	2.42	4.69	1.38	1.09	3.11	15.96
dq	1.80	2.98	1.92	1.04	2.07	4.52
Xl	- 0.47	- 0.39	- 1.01	- 0.42	0.55	9.80
Xu	14.39	5.93	3.21	2.69	3.49	17.99

DEPENDENCY OF MATERNAL BEHAVIOUR UPON CHILD BEHAVIOUR—ASSESSMENT 1

NONINTERVENTION MH GROUP

SUB	IEPO/ MEPO	ISMI/ MSMI	ILKS/ MLKS	IVPO/ MIMI	IVPO/ VSTM	VCOM/ VRFT
111	- 0.20	0.00	0.47	0.00	2.51	0.00
151	- 0.22	12.28	6.78	3.43	2.54	7.88
202	5.69	0.84	2.43	9.12	1.67	5.37
221	8.85	0.80	- 1.21	6.23	0.94	- 0.26
231	11.14	1.89	0.19	7.86	0.37	0.00
241	5.73	0.84	2.43	9.13	1.64	5.38
251	5.77	- 0.34	- 0.40	9.57	0.74	8.14
261	9.20	0.15	- 2.11	0.00	- 0.52	0.00
281	8.85	0.80	- 1.21	6.23	0.94	- 0.26
Md	5.77	0.81	0.19	6.23	0.95	0.00
Ql	5.68	0.14	- 1.17	3.43	0.73	- 0.00
Qu	8.86	0.86	2.39	9.12	1.68	5.38
dq	3.17	0.71	3.57	5.69	0.94	5.38
Xl	- 0.22	- 0.34	- 2.11	0.00	- 0.52	- 0.26
Xu	11.14	12.28	6.78	9.57	2.54	8.14

SHORT INTERVENTION MH GROUP

SUB	IEPO/ MEPO	ISMI/ MSMI	ILKS/ MLKS	IVPO/ MIMI	IVPO/ VSTM	VCOM/ VRFT
321	0.00	- 0.78	- 1.76	5.86	1.32	0.00
381	7.46	- 0.38	1.09	10.35	1.69	9.25
361	2.43	0.09	- 0.03	5.54	- 0.83	10.39
421	- 0.22	- 0.32	- 0.50	6.36	1.69	- 0.16
601	0.77	11.72	14.86	8.31	2.91	- 0.16
621	5.07	9.84	16.26	14.17	1.17	3.77
631	- 0.17	5.95	6.03	4.00	4.03	10.25
642	0.51	21.53	- 0.99	3.11	4.27	6.03
651	- 0.05	21.26	7.04	- 0.22	0.35	11.42
Md	0.51	5.95	1.09	5.86	1.65	6.03
Ql	- 0.06	- 0.34	- 0.62	3.92	1.13	- 0.04
Qu	2.44	11.73	7.16	8.39	2.95	10.28
dq	2.50	12.06	7.76	4.46	1.80	10.32
Xl	- 0.22	- 0.78	- 1.76	- 0.22	- 0.83	- 0.16
Xu	7.46	21.53	16.26	14.17	4.27	11.42

LONG INTERVENTION MH GROUP

SUB	IEPO/ MEPO	ISMI/ MSMI	ILKS/ MLKS	IVPO/ MIMI	IVPO/ VSTM	VCOM/ VRFT
341	1.24	- 0.19	- 0.31	6.87	0 70	4.53
371	1.37	1.03	- 0.79	4.97	- 0.15	2.16
401	- 0.56	- 0.10	- 1.86	3.72	0.17	9.11
501	12.07	6.13	11.50	1.22	3.00	3.08
511	1.95	- 0.77	0.00	7.27	1.64	11.48
521	- 0.69	12.42	6.95	3.94	3.08	1.27
531	1.40	0.00	-1.68	12.85	- 0.06	13.62
711	- 0.08	13.01	9.65	8.26	2.68	7.77
721	6.05	- 0.11	3.50	0.00	0.66	4.89
Md	1.37	0.00	0.00	4.97	0.70	4.89
Ql	- 0.09	- 0.11	- 0.84	3.67	0.16	2.99
Qu	1.96	6.13	6.99	7.33	2.69	9.20
dq	2.04	6.24	7.83	3.66	2.53	6.21
Xl	- 0.69	- 0.77	- 1.86	0.00	- 0.15	1.27
Xu	12.07	13.01	11.50	12.85	3.00	13.62

NONHANDICAPPED M.A. COMPARISON GROUP

SUB	IEPO/ MEPO	ISMI/ MSMI	ILKS/ MLKS	IVPO/ MIMI	IVPO/ VSTM	VCOM/ VRFT
901	2.66	2.22	0.92	3.28	3.87	5.76
911	2.57	0.51	2.04	6.53	0.68	2.19
921	4.02	0.55	0.08	6.22	1.15	3.06
931	2.07	1.80	1.87	6.07	3.52	3.93
941	3.31	0.72	1.18	1.86	1.53	2.13
951	2.73	- 0.99	3.32	3.97	2.28	0.00
961	0.01	- 0.46	0.02	2.15	5.91	3.00
971	4.03	- 1.04	1.22	5.55	2.23	5.50
981	2.17	3.08	1.97	6.07	4.17	9.46
Md	2.66	0.55	1.22	5.55	2.28	3.06
Ql	2.17	- 0.47	0.91	3.24	1.51	2.17
Qu	3.31	1.81	1.98	6.13	3.88	5.51
dq	1.14	2.28	1.06	2.88	2.36	3.34
Xl	0.01	- 1.04	0.02	1.86	0.68	0.00
Xu	4.03	3.08	3.32	6.53	5.91	9.46

NONHANDICAPPED C.A. COMPARISON GROUP

SUB	IEPO/ MEPO	ISMI/ MSMI	ILKS/ MLKS	IVPO/ MIMI	IVPO/ VSTM	VCOM/ VRFT
801	0.76	2.45	3.29	3.94	5.64	10.44
811	6.60	3.14	2.90	3.76	2.09	8.32
821	1.09	1.49	- 0.53	4.12	1.02	4.88
831	4.69	0.34	0.45	3.47	1.67	11.17
841	1.49	- 0.27	2.93	5.22	1.20	3.46
851	6.44	2.09	0.21	4.19	4.08	5.17
861	5.49	1.29	0.28	9.09	3.15	14.73
871	5.65	0.03	6.20	7.63	0.36	21.42
881	3.88	- 0.52	1.64	5.03	2.67	13.12
Md	4.69	1.29	1.64	4.19	2.09	10.44
Ql	1.45	- 0.20	0.27	3.92	1.15	5.09
Qu	5.69	2.14	2.94	5.24	3.19	13.19
dq	4.24	2.16	2.66	1.31	2.04	8.09
Xl	0.76	- 0.52	- 0.53	3.47	0.36	3.46
Xu	6.60	3.14	6.20	9.09	5.64	21.42

MATERNAL AUTO LAGS—ASSESSMENT 1

NONINTERVENTION MH

SUB	MPCO/ VSTM	INST/ PGUI	STIP/ VSTM
111	- 0.07	4.01	0.21
151	5.20	- 0.26	0.59
202	0.63	- 0.39	2.12
221	1.58	2.66	0.76
231	0.49	3.67	1.76
241	0.62	- 0.39	2.12
251	2.69	8.89	- 0.96
261	0.66	4.58	- 0.58
281	1.58	2.66	0.76
Md	0.66	2.69	0.72
Ql	0.62	- 0.29	0.17
Qu	1.58	4.04	1.80
dq	0.96	4.33	1.63
Xl	- 0.07	- 0.39	- 0.96
Xu	5.20	8.89	2.12

LONG INTERVENTION MH

SUB	MPCO/ VSTM	INST/ PGUI	STIP/ VSTM
341	3.08	5.51	0.27
371	1.08	8.81	- 1.06
401	2.59	14.49	1.51
501	2.33	- 0.33	- 0.87
511	- 1.36	0.00	0.09
521	5.69	4.25	1.18
531	4.54	4.89	0.86
711	1.68	1.83	1.83
721	2.22	0.00	0.28
Md	2.35	4.25	0.28
Ql	1.65	0.04	0.09
Qu	3.11	5.59	1.18
dq	1.45	4.54	1.09
Xl	- 1.36	- 0.33	- 1.06
Xu	5.69	14.49	1.83

SHORT INTERVENTION MH

SUB	MPCO/ VSTM	INST/ PGUI	STIP/ VSTM
321	2.18	5.82	- 0.23
381	1.56	2.50	0.57
361	0.49	10.36	- 1.81
421	2.05	7.39	- 1.12
601	3.76	0.00	0.87
621	4.73	- 0.30	- 0.80
631	2.36	1.64	3.15
642	1.47	- 0.56	0.29
651	5.21	- 0.43	1.38
Md	2.18	1.64	0.29
Ql	1.54	- 0.33	- 0.87
Qu	3.78	5.85	0.94
dq	2.24	6.18	1.80
Xl	0.49	- 0.56	- 1.81
Xu	5.21	10.36	3.15

NONHANDICAPPED M.A.

SUB	MPCO/ VSTM	INST/ PGUI	STIP/ VSTM
901	1.70	12.02	0.76
911	4.85	10.32	- 0.24
921	1.77	13.83	0.48
931	1.79	3.04	1.17
941	0.35	3.87	- 0.48
951	4.08	15.60	- 0.92
961	1.88	12.68	0.90
971	3.94	6.85	1.02
981	1.12	10.52	0.45
Md	1.79	10.52	0.48
Ql	1.69	6.80	- 0.25
Qu	3.94	12.73	0.91
dq	2.25	5.93	1.15
Xl	0.35	3.04	- 0.92
Xu	4.85	15.60	1.17

NONHANDICAPPED C.A.

SUB	MPCO/ VSTM	INST/ PGUI	STIP/ VSTM
801	3.30	5.78	2.18
811	1.50	8.87	- 0.89
821	2.96	7.41	- 1.60
831	1.96	7.65	0.74
841	1.60	- 0.25	0.16
851	3.00	2.27	0.62
861	3.10	6.23	0.88
871	0.54	14.68	1.35
881	1.48	13.08	- 0.34
Md	1.96	7.41	0.62
Ql	1.49	5.72	- 0.37
Qu	3.01	8.93	0.91
dq	1.51	3.21	1.28
Xl	0.54	- 0.25	- 1.60
Xu	3.30	14.68	2.18

ASSESSMENT 2 DATA—TAKEN ON THE THREE MH GROUPS ONLY

CHILD BEHAVIOURS—NONINTERVENTION GROUP (ASSESSMENT 2)

SUB	IPCO	IEPO	IENE	ISMI	ILKS	IMIT	IVPO	IVNE	AGDES	VCOM
111	0.0	1.4	0.3	0.5	2.1	0.0	17.7	4.2	0.2	3.9
151	1.8	3.4	0.5	3.9	9.6	0.1	7.7	2.3	0.0	2.6
202	0.3	6.2	0.3	3.6	8.3	0.8	9.4	0.3	0.0	2.6
221	0.0	12.2	0.8	1.5	4.1	0.8	18.0	0.4	0.0	1.7
231	0.6	6.8	1.1	3.5	6.8	1.8	10.5	1.3	0.0	1.3
241	4.7	0.4	0.0	9.4	11.7	0.3	16.9	1.8	0.0	0.3
251	2.8	1.4	0.0	3.9	6.5	0.0	22.5	2.0	0.0	2.5
261	0.4	6.7	1.2	2.6	7.3	0.8	10.5	1.6	0.2	1.0
281	0.6	5.9	0.2	4.5	9.1	0.6	10.6	1.0	0.0	0.2
Md	0.58	5.90	0.33	3.60	7.30	0.60	10.60	1.60	0.03	1.70
Ql	0.28	1.41	0.18	2.58	6.42	0.08	10.46	0.97	0.04	0.97
Qu	1.82	6.72	0.83	3.94	9.17	0.81	17.72	2.02	0.09	2.59
dq	1.55	5.31	0.65	1.36	2.75	0.73	7.26	1.05	0.13	1.61
Xl	0.00	0.40	0.00	0.50	2.10	0.00	7.70	0.30	0.00	0.30
Xu	4.70	12.20	1.20	9.40	11.70	1.80	22.50	4.20	0.20	3.90

CHILD BEHAVIOURS—SHORT INTERVENTION GROUP (ASSESSMENT 2)

SUB	IPCO	IEPO	IENE	ISMI	ILKS	IMIT	IVPO	IVNE	AGDES	VCOM
321	0.8	5.9	0.2	2.7	3.7	0.8	7.2	0.2	0.0	0.6
381	0.9	6.1	0.7	4.3	6.1	0.3	5.1	1.2	0.0	0.3
361	0.0	4.0	0.8	1.0	7.2	0.0	3.5	0.5	0.0	1.6
421	0.9	7.0	0.0	3.0	9.6	0.0	21.1	0.5	0.0	0.3
601	1.5	2.3	0.0	5.5	5.8	0.0	9.0	1.0	0.2	3.5
621	0.4	2.6	0.2	3.8	13.3	0.1	9.1	0.0	0.9	4.5
631	2.6	6.8	0.0	0.6	5.7	0.2	19.1	2.3	0.0	4.7
642	0.0	9.9	0.9	3.1	6.3	3.0	18.4	0.0	0.0	1.4
651	0.3	3.7	0.0	0.2	3.9	0.0	16.7	0.0	1.9	7.8
Md	0.80	5.90	0.18	3.00	6.10	0.10	9.10	0.45	0.05	1.60
Ql	0.28	3.65	0.01	0.98	5.67	0.01	7.17	0.05	0.03	0.55
Qu	0.94	6.85	0.73	3.83	7.22	0.33	18.42	1.05	0.25	4.55
dq	0.66	3.20	0.72	2.84	1.55	0.32	11.25	1.00	0.27	4.00
Xl	0.00	2.30	0.00	0.20	3.70	0.00	3.50	0.00	0.00	0.30
Xu	2.60	9.90	0.90	5.50	13.30	3.00	21.10	2.30	1.90	7.80

CHILD BEHAVIOURS—LONG INTERVENTION GROUP (ASSESSMENT 2)

SUB	IPCO	IEPO	IENE	ISMI	ILKS	IMIT	IVPO	IVNE	AGDES	VCOM
341	0.3	7.9	0.0	2.3	4.7	0.0	7.9	0.3	0.0	1.2
371	0.9	4.9	1.2	4.3	6.2	1.9	9.6	0.7	0.0	1.6
401	1.0	3.4	0.6	2.2	10.2	0.0	7.0	3.2	0.0	1.2
501	0.0	8.2	0.0	1.4	6.5	0.0	23.0	0.0	0.0	1.4
511	3.5	1.2	0.0	4.9	10.3	0.5	11.5	0.0	0.0	2.6
521	1.7	3.9	0.0	2.5	9.2	0.0	11.3	0.7	0.0	2.6
531	0.2	3.2	0.6	0.8	2.3	0.0	1.7	0.0	0.0	2.3
711	2.9	3.6	0.4	7.1	5.9	0.3	12.3	0.3	0.1	0.6
721	1.5	3.6	1.9	2.7	7.1	1.1	14.9	1.1	0.6	1.5
Md	1.00	3.65	0.40	2.50	6.50	0.08	11.30	0.38	0.01	1.50
Ql	0.28	3.35	0.01	2.17	5.87	0.01	7.85	0.08	0.02	1.21
Qu	1.72	4.95	0.68	4.33	9.22	0.55	12.35	0.81	0.05	2.33
dq	1.44	1.60	0.66	2.14	3.35	0.56	4.50	0.73	0.06	1.11
Xl	0.00	1.20	0.00	0.80	2.30	0.00	1.70	0.00	0.00	0.60
Xu	3.50	8.20	1.90	7.10	10.30	1.90	23.00	3.20	0.60	2.60

MATERNAL BEHAVIOURS—NONINTERVENTION (ASSESSMENT 2)

SUB	MPCO	MEPO	MENE	MSMI	MLKS	MIMI	STIP	VRFT	MVNE	VSTM	LABL	EXPD	INST	PGUI
111	4.5	0.3	0.1	0.0	5.9	0.0	2.6	3.0	2.4	26.5	5.4	0.2	16.3	2.7
151	10.4	2.2	0.3	0.1	11.5	0.1	13.7	2.7	0.0	18.4	0.9	0.0	7.7	0.1
202	0.9	4.1	0.2	3.8	8.2	0.2	2.9	1.7	0.0	30.3	2.9	1.8	10.8	0.6
221	0.2	6.2	0.9	2.3	6.6	2.1	4.5	1.5	0.0	15.2	8.1	2.4	10.5	0.2
231	1.8	5.9	2.5	3.4	6.6	0.6	3.0	1.1	0.0	31.5	1.3	0.7	7.5	0.6
241	7.6	0.1	0.1	0.4	12.2	0.6	0.4	0.4	4.7	21.4	0.6	0.4	5.1	0.1
251	5.3	2.0	0.0	0.0	11.0	0.0	2.5	0.6	0.3	21.6	2.8	0.0	12.1	0.3
261	2.0	4.1	0.4	4.5	7.5	0.8	4.7	0.4	0.0	34.3	0.8	0.6	7.7	0.0
281	6.3	6.7	0.0	4.3	5.5	1.0	5.9	0.6	0.0	28.5	4.9	0.6	2.4	0.6
Md	4.50	4.05	0.20	2.30	7.50	0.56	3.00	1.10	0.08	26.50	2.80	0.58	7.75	0.30
Ql	1.75	1.95	0.06	0.08	6.45	0.08	2.58	0.53	- 0.04	21.35	0.88	0.18	7.45	0.11
Qu	6.35	5.95	0.43	3.82	11.10	0.83	4.72	1.75	0.38	30.35	4.92	0.73	10.85	0.61
dq	4.60	4.00	0.36	3.75	4.65	0.75	2.15	1.22	0.41	9.00	4.05	0.55	3.40	0.49
Xl	0.20	0.10	0.00	0.00	5.50	0.00	0.40	0.40	0.00	15.20	0.60	0.00	2.40	0.00
Xu	10.40	6.70	2.50	4.50	12.20	2.10	13.70	3.00	4.70	34.30	8.10	2.40	16.30	2.70

MATERNAL BEHAVIOURS—SHORT INTERVENTION GROUP (ASSESSMENT 2)

SUB	MPCO	MEPO	MENE	MSMI	MLKS	MIMI	STIP	VRFT	MVNE	VSTM	LABL	EXPD	INST	PGUI
321	9.8	3.9	0.0	2.9	7.2	1.8	4.7	3.3	0.0	34.4	4.1	0.0	3.9	1.8
381	6.1	7.7	0.2	3.6	8.0	2.7	4.8	3.4	0.0	33.7	1.2	0.0	2.6	1.0
361	0.0	6.9	1.3	2.9	12.3	0.0	0.8	2.1	0.0	37.9	6.1	0.0	10.1	0.8
421	15.2	6.3	0.0	0.3	9.8	1.4	4.0	0.3	0.0	17.8	0.3	0.0	1.9	0.3
601	9.3	2.8	0.1	1.7	9.7	0.0	3.9	1.3	0.0	27.4	5.0	1.2	8.6	0.3
621	5.8	2.9	0.3	0.5	12.9	0.8	2.8	3.5	0.0	19.3	2.8	0.7	11.0	1.6
631	2.3	7.4	0.2	0.3	6.9	0.0	2.0	2.3	0.0	18.5	2.9	1.7	12.9	1.1
642	0.3	9.2	0.3	3.3	4.5	0.7	6.7	0.3	0.0	19.8	4.7	1.4	4.7	1.0
651	2.7	3.9	0.0	0.2	7.8	0.2	2.9	6.3	0.0	15.9	4.2	2.2	18.9	0.7
Md	5.80	6.30	0.18	1.70	8.00	0.70	3.90	2.30	0.00	19.80	4.10	0.70	8.60	0.97
Ql	2.24	3.86	0.03	0.31	7.17	0.03	2.78	1.28	0.00	18.38	2.78	0.01	3.72	0.68
Qu	9.37	7.42	0.29	2.94	9.83	1.42	4.72	3.42	0.00	33.82	4.72	1.45	11.18	1.12
dq	7.15	3.56	0.26	2.62	2.65	1.40	1.94	2.14	0.00	15.44	1.94	1.44	7.45	0.44
Xl	0.00	2.80	0.00	0.20	4.50	0.00	0.80	0.30	0.00	15.90	0.30	0.00	1.90	0.30
Xu	15.20	9.20	1.30	3.60	12.90	2.70	6.70	6.30	0.00	37.90	6.10	2.20	18.90	1.80

MATERNAL BEHAVIOURS—LONG INTERVENTION GROUP (ASSESSMENT 2)

SUB	MPCO	MEPO	MENE	MSMI	MLKS	MIMI	STIP	VRFT	MVNE	VSTM	LABL	EXPD	INST	PGUI
341	2.6	9.6	0.3	5.6	8.2	0.0	2.0	2.3	0.0	32.2	1.8	0.0	7.9	2.9
371	2.2	4.6	1.2	3.8	6.9	2.0	2.8	2.7	0.3	28.0	3.2	1.4	8.3	1.2
401	7.0	3.0	0.0	0.0	14.8	0.2	5.2	1.0	0.0	21.8	9.2	0.0	3.8	5.2
501	0.7	8.2	0.2	0.7	8.5	0.3	1.9	0.7	0.0	23.4	7.5	1.2	5.5	0.9
511	9.0	1.2	0.0	0.3	11.1	0.0	1.0	0.7	1.2	23.7	8.3	0.0	7.7	1.2
521	7.4	3.9	0.0	0.3	13.5	0.4	2.6	0.9	0.0	21.9	6.0	0.4	9.2	1.5
531	2.1	3.6	0.0	2.5	6.1	0.0	8.3	7.6	0.0	42.5	0.6	0.0	10.8	4.9
711	2.9	4.6	0.1	1.7	5.2	1.4	1.0	0.9	0.1	33.8	6.2	0.6	6.4	1.3
721	0.2	5.9	1.1	2.3	8.4	2.1	0.6	0.4	0.6	22.3	1.7	0.0	18.1	0.4
Md	2.60	4.53	0.10	1.70	8.40	0.30	2.00	0.93	0.04	23.70	2.00	0.08	7.90	1.30
Ql	2.08	3.53	0.01	0.33	6.87	0.03	1.01	0.71	- 0.01	22.27	1.78	- 0.01	6.35	1.16
Qu	7.02	5.97	0.33	2.55	11.13	1.42	2.83	2.32	0.33	32.22	7.53	0.65	9.25	2.92
dq	4.94	2.44	0.32	2.22	4.25	1.40	1.81	1.61	0.33	9.95	5.75	0.66	2.90	1.76
Xl	0.20	1.20	0.00	0.00	5.20	0.00	0.60	0.40	0.00	21.80	0.60	0.00	3.80	0.40
Xu	9.00	9.60	1.20	5.60	14.80	2.10	8.30	7.60	1.20	42.50	9.20	1.40	18.10	5.20

DEPENDENCY OF CHILD BEHAVIOUR UPON MATERNAL BEHAVIOUR—ASSESSMENT 2

NONINTERVENTION MH GROUP

SUB	MPCO/ ISMI	MEPO/ IEPO	MSMI/ ISMI	MLKS/ ILKS	VSTM/ IVPO	INST/ VCOM
111	3.98	5.34	0.00	6.65	0.83	8.95
151	9.92	15.41	- 0.29	9.05	0.30	13.15
202	1.66	5.84	0.84	2.15	1.12	12.79
221	0.00	0.13	- 0.37	0.37	2.25	9.00
231	0.72	7.09	1.11	0.09	1.84	8.66
241	- 0.50	14.26	- 0.58	2.56	1.83	5.60
251	1.30	6.72	0.00	3.18	1.86	3.59
261	- 0.49	2.80	0.52	- 0.16	- 0.53	7.48
281	- 1.17	5.37	- 0.07	- 0.52	- 0.07	5.75
Md	0.72	5.84	- 0.02	2.15	1.12	8.66
Ql	- 0.49	5.33	- 0.31	0.03	0.30	5.74
Qu	1.66	7.09	0.54	3.24	1.84	9.01
dq	2.15	1.76	0.84	3.21	1.54	3.27
Xl	- 1.17	0.13	- 0.58	- 0.52	- 0.53	3.59
Xu	9.92	15.41	1.11	9.05	2.25	13.15

SHORT INTERVENTION MH GROUP

SUB	MPCO/ ISMI	MEPO/ IEPO	MSMI/ ISMI	MLKS/ ILKS	VSTM/ IVPO	INST/ VCOM
321	2.56	2.51	- 0.68	0.50	0.69	8.05
381	3.90	10.64	0.99	- 1.32	0.06	5.79
361	0.00	2.83	- 0.33	- 1.00	- 0.95	6.24
421	4.95	19.38	- 0.24	2.78	2.80	9.43
601	14.42	19.82	0.03	3.63	1.84	17.38
621	14.53	21.40	3.97	4.23	2.17	16.44
631	- 0.30	18.62	0.00	3.02	1.41	12.44
642	7.59	1.58	0.55	1.69	1.49	8.98
651	- 0.17	20.95	- 0.04	7.84	2.38	10.46
Md	3.90	18.62	0.00	2.78	1.49	9.43
Ql	- 0.03	2.75	- 0.25	0.44	0.67	7.94
Qu	7.62	19.90	0.56	3.69	2.19	12.55
dq	7.64	17.15	0.80	3.25	1.52	4.61
Xl	- 0.30	1.58	- 0.68	- 1.32	- 0.95	5.79
Xu	14.53	21.40	3.97	7.84	2.80	17.38

LONG INTERVENTION MH GROUP

SUB	MPCO/ ISMI	MEPO/ IEPO	MSMI/ ISMI	MLKS/ ILKS	VSTM/ IVPO	INST/ VCOM
341	3.77	4.98	3.30	3.17	0.39	6.62
371	- 0.88	2.44	2.44	0.24	- 0.56	10.65
401	2.47	18.89	0.00	8.83	- 0.18	10.73
501	- 0.24	3.65	4.64	2.07	2.83	9.77
511	10.13	19.06	- 0.33	6.73	3.12	9.65
521	3.32	22.41	- 0.23	9.51	1.29	12.26
531	- 0.31	7.85	- 0.36	- 0.97	- 0.01	7.69
711	4.51	1.53	1.07	0.44	3.17	7.32
721	0.00	- 0.26	1.47	- 0.12	0.74	3.64
Md	2.47	4.98	1.07	2.07	0.74	9.65
Ql	- 0.26	2.40	- 0.24	0.19	- 0.02	7.30
Qu	3.79	18.93	2.45	6.78	2.84	10.67
dq	4.04	16.53	2.68	6.59	2.86	3.37
Xl	- 0.88	- 0.26	- 0.36	- 0.97	- 0.56	3.64
Xu	10.13	22.41	4.64	9.51	3.17	12.26

DEPENDENCY OF MATERNAL BEHAVIOUR UPON CHILD BEHAVIOUR—ASSESSMENT 2

NONINTERVENTION MH GROUP

SUB	IEPO/ MEPO	ISMI/ MSMI	ILKS/ MLKS	IVPO/ MIMI	IVPO/ VSTM	VCOM/ VRFT
111	- 0.18	0.00	5.64	0.00	3.68	6.44
151	0.23	- 0.29	10.35	0.00	0.87	10.17
202	1.10	0.78	- 0.90	2.61	3.34	11.66
221	1.35	- 0.41	1.27	4.08	1.13	2.16
231	4.43	0.11	1.68	3.65	3.72	6.76
241	- 0.07	1.19	10.46	3.62	3.11	- 0.10
251	3.24	0.00	6.11	0.00	2.96	5.21
261	7.57	- 0.81	- 0.70	4.06	- 0.19	- 0.11
281	1.23	- 0.07	1.29	5.47	0.19	0.00
Md	1.23	- 0.02	1.68	3.62	2.96	5.21
Ql	0.20	- 0.31	1.26	0.01	0.86	- 0.00
Qu	3.27	0.13	6.11	4.07	3.35	6.76
dq	3.06	0.43	4.84	4.06	2.48	6.76
Xl	- 0.18	- 0.81	- 0.90	0.00	- 0.19	- 0.93
Xu	7.57	1.19	10.46	5.47	3.72	10.17

SHORT INTERVENTION MH GROUP

SUB	IEPO/ MEPO	ISMI/ MSMI	ILKS/ MLKS	IVPO/ MIMI	IVPO/ VSTM	VCOM/ VRFT
321	0.74	- 0.63	2.49	10.44	- 1.27	7.23
381	2.12	1.88	- 0.76	9.78	- 0.89	0.00
361	- 0.06	- 0.37	0.11	0.00	1.86	6.10
421	0.19	7.98	14.18	4.18	0.79	- 0.06
601	2.90	6.98	12.42	0.00	3.53	10.21
621	0.13	1.67	15.10	6.46	3.17	16.10
631	0.16	8.37	8.43	0.00	1.08	5.93
642	4.64	0.55	1.63	2.61	1.63	5.43
651	0.09	- 0.04	4.36	2.12	1.70	15.59
Md	0.19	1.67	4.36	2.61	1.63	6.10
Ql	0.12	- 0.09	1.41	0.12	0.77	5.41
Qu	2.13	7.03	12.63	6.58	1.88	10.21
dq	2.00	7.12	11.22	6.46	1.10	4.80
Xl	- 0.06	- 0.63	- 0.76	0.00	- 1.27	- 0.06
Xu	4.64	8.37	15.10	10.44	3.53	16.10

LONG INTERVENTION MH GROUP

SUB	IEPO/ MEPO	ISMI/ MSMI	ILKS/ MLKS	IVPO/ MIMI	IVPO/ VSTM	VCOM/ VRFT
341	1.03	- 0.71	0.68	0.00	2.29	6.67
371	1.66	- 0.31	- 0.91	5.04	0.92	8.33
401	0.72	0.00	1.65	3.35	4.10	- 0.24
501	15.87	14.21	12.54	2.09	2.67	15.31
511	2.92	5.79	9.89	0.00	4.63	7.20
521	0.82	4.12	4.80	4.11	3.11	11.78
531	2.90	- 0.36	1.23	0.00	2.20	7.34
711	1.56	- 0.00	6.48	5.43	4.07	- 0.17
721	4.40	- 0.48	- 1.31	4.00	3.55	- 0.18
Md	1.66	- 0.01	1.65	3.35	3.11	7.20
Ql	1.03	- 0.37	0.58	0.03	2.28	- 0.17
Qu	2.93	4.13	6.58	4.14	4.08	8.33
dq	1.90	4.50	6.00	4.11	1.79	8.50
Xl	0.72	- 0.71	- 1.31	0.00	0.92	- 0.24
Xu	15.87	14.21	12.54	5.43	4.63	15.31

MATERNAL AUTO LAGS—ASSESSMENT 2

NONINTERVENTION MH

SUB	MPCO/ VSTM	INST/ PGUI	STIP/ VSTM
111	0.58	0.02	- 1.14
151	0.48	- 0.22	1.63
202	1.31	5.15	2.40
221	0.00	2.97	0.74
231	2.80	4.76	- 1.20
241	5.57	- 0.24	- 0.42
251	0.00	2.23	0.09
261	2.04	0.00	- 1.37
281	2.33	9.98	- 0.89
Md	1.31	2.23	- 0.42
Ql	0.46	- 0.01	- 1.16
Qu	2.35	4.76	0.76
dq	1.90	4.77	1.91
Xl	0.00	- 0.24	- 1.37
Xu	5.57	9.98	2.40

SHORT INTERVENTION MH

SUB	MPCO/ VSTM	INST/ PGUI	STIP/ VSTM
321	3.84	12.42	0.00
381	3.42	14.25	- 0.84
361	0.00	4.82	- 0.58
421	2.37	- 0.21	- 0.65
601	- 0.58	1.02	0.55
621	1.13	4.20	- 1.09
631	0.63	2.99	0.37
642	- 0.64	8.69	0.17
651	0.49	0.81	1.05
Md	0.63	4.20	0.00
Ql	- 0.02	0.97	- 0.67
Qu	2.38	8.74	0.39
dq	2.40	7.77	1.05
Xl	- 0.64	- 0.21	- 1.09
Xu	3.84	14.25	1.05

LONG INTERVENTION MH

SUB	MPCO/ VSTM	INST/ PGUI	STIP/ VSTM
341	2.16	3.69	- 0.71
371	6.16	5.83	1.22
401	2.05	1.14	0.00
501	1.41	- 0.46	- 0.63
511	1.25	2.03	0.91
521	3.19	4.68	0.40
531	2.89	10.47	0.52
711	0.72	11.03	1.03
721	0.00	1.86	1.28
Md	2.05	3.69	0.52
Ql	1.22	1.82	- 0.02
Qu	2.92	5.87	1.04
dq	1.70	4.05	1.06
Xl	0.00	- 0.46	- 0.71
Xu	6.16	11.03	1.28

APPENDIX D: SAMPLE EARLY INTERVENTION PROGRAM ACTIVITIES

Permission to use the following sample program activities from the Mayfield School Early Education Home Program was granted by the Acting Program Supervisor, Joan Anderson.

INCIDENTAL MODEL

"Tell—Show—Do"

TELL
Tell your child what you want him/her to do. Give your child a few seconds to respond to your request.

Say:

If your child does it correctly → Praise your child, letting him/her know what it is that they did that you liked.

Score "5"

If your child doesn't do it, then provide him/her with a model or gesture.

SHOW
Tell and show your child what you want him/her to do. Give your child a few seconds to respond to your request and gesture.

Say:
Show:

If your child does it correctly → Praise your child, letting him/her know what it is that they did that you liked.

Score "3"

If your child doesn't do it, then physically assist him/her to do it.

DO
Tell and do it with your child.

Say:
Do:

If your child does it correctly → Praise your child, letting him/her know what it is that they did that you liked

Score "1"

DAILY ACTIVITIES LIST

During your child's regular daily activities, try doing the following activities:

A. During Feeding

This is a good time to try some eye contact and tracking. Get the child's attention—hold the spoon of food/drink close enough for the child to see it. When the child has focused on the object, slowly move the spoon to the right or left or the child. If the child does not follow, assist him by placing one hand under chin and following the spoon. Reinforce the child by giving him the food! This can become a fun way of learning. Feeding is also a good time to do some gustatory stimulation. In fact, you are doing it already! Any taste is something that stimulates the taste buds.

Introducing new tastes can be fun for both of you. Observe your child's reaction. Does he make a face? Does he open his mouth for more?

Let your child smell the food before he eats it. Observe the child's reaction. This is a nice way to work on anticipatory response. The child may, after time, associate the smell with the correct food. Is the child's response to smell similar to the response once he has tasted it?

B. During Bath Time

Bathing is a great time to do some tactile stimulation. The child gets the feel of nice warm water and soap on his body. Facecloths, bubbles, soft materials can be rubbed over the child's body during or after the bath. A nice rub down with cream after the bath can be very pleasant for both child and parent.

C. Diaper Change/Dressing

Again, a good time to practice eye contact and tracking. Try making faces to keep your child's attention. Making sounds can keep the child's attention on your face. They may fuss less with diaper changing if it becomes a fun time.

Tactile stimulation can also be done at this time. Tracking and blowing bubbles on the child's tummy is always fun for both.

D. Playtime

This is a time when you can incorporate as many types of stimulation as you would like. Auditory stimulation can be fun—musical toys, records, your own voice! Let your child look at and touch the object that the music is coming from. Put their hands on the speaker and let them feel the vibrations.

E. Child's Individual Time

Now is a good time for you to sit back and have a rest! You can often come up with some good activities for your child by observing them as they play independently. Does your child look around the room? Are there bright things close by for him to focus on? Are there toys close by for him to reach for? Your child will benefit from some "alone time." Your child must learn to find ways of entertaining himself. You can assist by making sure that his environment is set up in such a way that toys are within reach for your child to interact with them.

EARLY EDUCATION HOME PROGRAM

Developmental Area: Cognition

Incidental Program: Anticipation

Target Behaviour

For the child to show anticipation of an event from clues in the environment.

Correct Response

Child will show that he anticipates an event from clues in his environment. E.g. child looks towards the door when the door bell rings.

Setting

Any position.

Materials

Materials will depend on what activity you have chosen (see activities).

Activities

1. Call the child's attention to sounds that precede an event by having him listen to noises that give clues about the next event. Example, a noise at the door (key, knock, or bell) and footsteps on the stairs may mean daddy is home; water running may mean bath time; a lullaby may mean naptime.

2. Call the child's attention to certain activities that precede others, for example, opening the refrigerator and preparing food has to occur before the child can have a drink or something to eat; coats and hats must be put on before you go outside when it is cold. Describe what you are doing and have the child watch your preparations.

3. Help the child anticipate dressing activities by holding a shirt up and waiting for him to raise his arms. Show him you are pleased when he starts to actively cooperate.

EARLY EDUCATION HOME PROGRAM

Developmental Area: Cogniton II

Incidental Activity: Looks in correct place for toys that roll out of sight.

Target Behaviour

For the child to look in the correct place for toys that roll out of sight.

Setting

Anytime, anywhere.

Activities

1. Cut the ends of a shoe box. Have the child push a toy car through one end and find the toy at the other end.

2. Use the same shoe box as in the first activity, but this time drape the ends with material and have the child push the car through and find it at the other end.

3. While playing ball, purposely roll a ball under a chair or table. Have the child find and get the ball (take the child behind the chair or table and show him the ball is on the other side, if he doesn't do this on his own).

4. Roll a ball under a small table that has a blanket draped over it. Show him that the ball is not under the table and direct his attention to the place where it has come out. Help him move around the table to find the ball.

5. Repeat the activity using other pieces of furniture such as a bed, chair, or couch. Child should start to anticipate the ball's path so that he does not have to wait to see where the ball emerges.

EARLY EDUCATION HOME PROGRAM

Developmental Area: Communication

Program: Imitation of Familiar Babbling Sounds

Entry Criteria: Before beginning this program, the child should vocalize in response to babbling sounds and preferably vocalize similar sounds in response to babbling sounds.

Target Behaviour: For the child to imitate a minimum of three familiar babbling sounds.

Correct Response: The child will imitate familiar babbling sounds that are in his repertoire. The child may initially vocalize a similar sound in response to yours and then shift to match those of yours, or may imitate the babbling sound immediately.

Setting: Vocal imitation is best worked on within a pleasant semi-structured atmosphere. It seems helpful to integrate vocal imitation with other activities (i.e. during play, at bath time, while dressing, etc.) and encourage it within the content of naturally occurring interactions between yourself and your child.

Materials: None.

Procedure: Present the sound you want your child to imitate and then wait at least 10 seconds to give your child a chance to respond. If your child has not responded within the 10 seconds then present the sound again paired with an additional prompt. Again wait at least 10 seconds before trying another sound.

**See attached list of suggestions for the types of cues you could use with your child. Remember that you may have to experiment with a number of the prompts to find which one(s) will work best with your child.

Generalization:

1. Once your child is consistently vocalizing in response to your imitation of his babbling sounds, expand the types of vocalizations the child responds to. Present similar but different patterns—e.g. if the child vocalizes "dada" and responds to it consistently, try presenting a new sound that he is not making and see what occurs: e.g. "ahgoo, ee.".

2. Try and increase the number of turns you and your child take. Rather than have him respond to your imitation once and then stopping, imitate the child again and see how long you can keep the game going.

3. Although babbling sounds do not sound like recognizable words to us, attach some meaning to them as they happen (e.g. if a child says "dada", point to dad and say "yes, daddy").

4. Try pairing a simple action with a sound (e.g. clap your hands and say "papa").

5. Continue to keep a running list of what sounds your child can imitate.

The following list consists of additional prompts you may want to try with your child when trying to encourage him to imitate your vocalizations.

Remember that each child is different in how he/she relates to your prompts, so you may have to try a number of these suggestions in order to find out which one(s) work.

1. Slightly exaggerate the sound you are making.
2. Change the pitch, duration, or loudness of the sound to emphasize it.
3. Have someone else (e.g. sibling, puppet) model the sound again.
4. Stroke, tickle, or gently touch your child to encourage him to vocalize.
5. Rough house with your child to encourage him to vocalize.
6. Smile at your child to express encouragement—anticipation of the sound you want him/her to make.
7. Open your eyes wide.
8. Lean forward—towards your child.
9. Mouth the sound you want your child to make.